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RICHARD STRAUSS

Orchestral Instruments and Their Use

Giving a Description of Each Instrument Now Employed by Civilised Nations, a Brief Account of Its History, an Idea of the Technical and Acoustical Principles Illustrated by Its Performance, and an Explanation of Its Value and Functions in the Modern Orchestra

By

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Illustrated

BOSTON

L. C. PAGE & COMPANY

PUBLISHERS

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Fourth Impression, March, 1909

Electrotyped and Printed at
THE COLONIAL PRESS:
C. H. Simonds & Co., Boston, U.S.A.

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ORCHESTRAL INSTRUMENTS AND THEIR USE

CHAPTER I.

PRIMITIVE AND SAVAGE INSTRUMENTS

WHATEVER origin may be assigned to music, — whether imitation of bird-calls, differences in cries of attack and defence, or a natural expression of the feelings, — there can be no doubt that musical instruments in their primitive forms were derived directly from nature. According to the definition of Fétis, music is simply the art of moving the emotions by combinations of sounds, and while these combinations are the result of human efforts, the methods of producing single tones were plainly suggested by the inanimate world. The whistling of the wind in bamboo rods, the creaking of branches when rubbed together, or the rumbling of a hollow

tree when struck, are but a few of the many causes that led our savage ancestors into the paths of art. The twang of the bowstring may well have suggested a rudimentary harp. In Egyptian mythology, we find the invention of the lyre ascribed to Thoth (Hermes), who found, while wandering by the edge of the receding Nile, the concave shell of a tortoise, with tendons stretched across it which gave out a musical sound when struck accidentally by his foot.

In the multitude of instruments that have given pleasure to mankind, from the time of the cave-dwellers to the present era, there are but three real methods of causing sounds. In the symphonies of to-day, precisely as in the services of ancient Egypt or primeval China, musical tones result from the vibration of strings, the vibration of columns of air or substances set in motion by air-currents, and the vibration of solid or hollow bodies set in motion by blows.

The strings, or whatever material corresponds to them, may be set in motion by being rubbed, plucked, or struck with anything suited to that purpose. The current of air may actually vibrate itself, in tubes of various length; or it may set in motion such objects as thin tongues

of reed or wood, flat bits of metal, the vocal cords in the human throat, or the lips of a performer pressed against the mouthpiece of an instrument. The solid or hollow bodies that vibrate under blows (instruments of percussion, they are called) may consist of almost any substance, — stretched skins or parchment, wood, stone, various kinds of metals, — and may have almost any shape.

According to the records, the most ancient instrument is the flute, or whistle based upon the flute principle. A rudely fashioned bone of an Irish elk, found near Desmond Castle, a whistle of reindeer bone discovered among troglodyte relics in the Dordogne valley, a bone pierced with several holes that was unearthed with old flint implements at Gourdan, and a stag-horn flute found near Poitiers, show us that if the cave-dwellers were not provided with orchestras, they at least possessed solo instruments. Of a later date than the stone age are the bronze tubes found in Belgium and Schleswig. But the most wonderful examples of this period are the old Egyptian flutes, which give a complete diatonic scale.

Even to-day there are races that use these

primitive materials and principles in making their instruments. The Caribs in Guiana have for a long time employed jaguar bones for their flutes, but as these animals have become scarce, human bones are now used. Flutes of human bones have been found in New Zealand, and the Surinam people in Guiana have the pleasing custom of making such flutes from the bones of slain enemies. Undoubtedly the wide dissemination and extreme antiquity of the flute is due to its simplicity of construction. The raw materials were at hand wherever bones were found, wherever reeds or bamboos could grow. The Greeks had a proverb which said of the reed that it helped to subjugate nations by furnishing arrows, to soften men's manners by the charm of music, and to educate them by affording a means for tracing letters. While the earliest flutes seem to have been instruments of war rather than peace, the widespread use of the reed is a noteworthy fact. Humboldt praised the skill of the Indians in making and tuning their flutes. Schweinfurth admired the African Bongos for the same ability. Cook noticed that the natives of Tahiti were able to tune their flutes by surrounding them with a leaf rolled

in a scroll, which could be lengthened or shortened at will.

As a rule, the savage tribes made but limited use of these instruments. The Kaffirs employed theirs merely to call their cattle. The Carib played his as a signal when he approached his home. The Iroquois brave sounded a special tune to entice his lady-love from the wigwam. Double flutes (V-shaped) have been found, and many flutes exist which were played upon by the nostrils instead of the mouth. In most of these the finger-holes are few in number, showing little real musical attainment on the part of their makers; although at times a series of players were assembled, each with a flute of different pitch, the band as a whole thus being capable of more ambitious flights. The syrinx, or pan-pipe, of more extended compass than the simple flute, has been found in many places, the most notable instance being an old Peruvian instrument of eight pipes cut from one piece of soft stone.

Instruments of the horn and trumpet family, in which the lips of the player vibrate against the mouthpiece of a long tube, have been widely known from the earliest times. The great length

of tube needed to produce a deep tone was very soon found to be awkward. While the Europeans succeeded in bending their tube artistically, the Karagwes of Africa adopted an ingenious arrangement by which the trumpet could be drawn in and out like a telescope. African horns have been made from many different materials, — ivory, wood, and even large sea-shells. Among many tribes the chief use of the horn was as a private signal. Just as the warrior Siegfried had his especial horn-call in Wagner's Trilogy, so many an African chief, sometimes even every member of a tribe, would be known by his own peculiar melody, showing his position in battle or his approach in time of peace. The seven-foot wooden war-trumpets of the Maoris, in New Zealand, could be heard at a distance of several miles.

The Indians on the upper Rio Negro made and used huge tubes resembling bassoons, of which eight different sizes were employed in their so-called devil's music. These instruments were made of bark spirally twisted and provided with a mouthpiece of leaves. Upon them the natives would play a regular melody, with correct accompaniment. Women were forbidden even to look

upon these instruments, on pain of death; and it is said that the poison used in punishment for breaking this rule has been given by fathers to their own daughters, by husbands to their own wives.

Another instrument much used by savage races was the gong. Here again the raw material was plentiful. Stone, wood, iron, brass, and copper have all been employed. In Borneo, small, crooked pieces of iron are hammered to produce sounds, while further metallic music is made by resounding chains which are thrown into the air. Skilful African players can elicit from the gong much more musical effects than one would expect at first sight of the instrument. Its chief use, however, seems to consist in arousing the natives to warlike frenzy,—an effect not wholly unknown among its hearers in more civilised nations. Bells, too, were frequently used, the original African forms being derived from rattles. The Pegu tribe of East India united twenty bells into one instrument, which was beaten with a stick. The Javese bells on Banda Island, twelve in number, sounded like a string orchestra when heard from a distance by the *Challenger* expedition.

Drums were until recently considered the earliest instruments, but the discovery of the primitive flutes has upset this belief. Drums are found of all shapes and sizes, from the skin-covered water-bowls of the Hottentots to the entire tree-trunks of the Ashantis. Among the various practical uses of the drum in Africa may be mentioned its employment to beat time for singers, to celebrate the arrival or departure of a traveller, to accompany native carriers in their work, and to give the rhythm of an actual code of signals, which are understood by the Dwalla tribes, for instance, as readily as the telegraph sounder is understood by the operator who hears it. Another instrument much favoured by African tribes was the marimba, a series of flat wooden sticks on gourds of various sizes. The difference in the sizes of the gourds produced a difference in the tones when the sticks were struck. Some writers have called it the original of our piano, though in fact it can hardly claim any greater honour than the rather doubtful one of having given rise to the xylophone.

Among examples of plucked-string instruments may be mentioned the many guitars that have been found among African tribes. Most per-

fect of these is the "lanku" of the Ashantis, a hollow wooden box perforated with holes and covered with a skin, to which a long neck is attached. Its eight strings, supported in two rows by a bridge, produce soft and soothing tones. Zithers are also known, with strings of twisted rattan threads or bamboo fibres.

The harp of the Kaffirs is a simple bow, with a hair string which can be tightened by means of a ring. Near one end of the bow is lashed a round hollow gourd, giving resonance to the tones when the string is struck. The development of the harp and lyre from the bow is now generally admitted, though the New Zealanders do not use bows and yet do possess the lyre. The African negroes have harps varying in size, consisting of from seven to eighteen strings. The natives of Guiana make a sort of æolian harp from the leaf stalk of the æta-palm, by separating its parallel fibres and placing a bridge under them. On the lower Congo lutes have been found, with strings of an elephant tail or threads of palm-trees. The mandolin in a crude form is a favourite instrument in Dahomey, while New Britain and the York Islands possess a primitive banjo.

The origin of the principle of tone-production

by friction is probably to be found in the common custom among savage tribes, in Africa, America, New Britain, and elsewhere, of rubbing two sticks together to produce a tone. Although the resulting sound is in many cases so fearfully and wonderfully made that wood-sawing is harmonious in comparison with it, the principle is so easy to apply that it is not surprising to find the savages stroking other things, such as for instance their bone flutes, as in Patagonia, or their hunting bows, as in the country of the African Damaras. The M'Balunda negroes possess a rude violin with three strings of plant fibre, while the Malays have a two-stringed instrument. In East Java is found a sort of flattened violoncello, made of an especial kind of thin cocoanut that is very rare and very costly, and provided with strings of horsehair.

The Arabian rebab, or rebaba, is frequently spoken of as the origin of our present violin. The rebab was an instrument of two strings, which were often plucked like those of a guitar, and only bowed in later times. The rise of the violin is more or less shrouded in mystery. Jean Rousseau, the musician, with naive assertiveness, begins his history of the violin with the

creation, and states that "If Adam had wished to make an instrument, he would have made a violin." Fétis, treating the question with more earnestness and authority, mentions the Welsh crwth, a primitive viol, as the origin of our bowed instruments, but we have no better proof of this than of their possible Indian or African origin. The nations of the ancient world had no knowledge of bowing, and it seems more probable that it developed in the way indicated, rather than by the application of the principle to instruments whose strings were already plucked. It is possible, however, that both of these suggestions possess some truth, and that the violin is the result of several independent developments in different places.

China, which was old before Greece and Rome were thought of, has for centuries possessed its system of music and its instruments. The invention of the latter is ascribed to Kai-tien-chi, the ninth emperor of the spiritual dynasty that is said to have ruled over the realm in mythical times. He perfected eight kinds of instruments, to which he gave more or less poetical names. Classified according to the eight kinds of sonorous bodies that the Chinese imagined

would produce musical tones, they are: 1. The sound of skin, produced from the tanned skin of various animals. 2. The sound of stone. 3. That of metal. 4. Of baked clay. 5. Of

GROUP OF CHINESE INSTRUMENTS, FOR USE OF SUBJECTS WHEN ASKING AUDIENCE OF THE EMPEROR YU. B. C. 2205

silken strings. 6. Of wood. 7. Of bamboo. 8. Of calabash.

In the first class are the eight varieties of Chinese drums, of various sizes, mostly barrel-shaped, two of the smaller ones being flatter and often filled with rice-grains. Musical stones date from very early times, some being received

as tribute in the year 2250 B. C. A set of sixteen of these stones, usually shaped like a carpenter's square and hung in a row, form what is known as the king. The sound of metal is employed in bells of various sizes, perhaps the most esteemed instruments in China. Baked clay is used to form a whistle, the hiuen, with from five to seven apertures. This was probably the most primitive instrument. Silk strings are found on the kin, which has seven in number, but gives only the five tones of the pentatonic scale. The che is much larger, and possesses twenty-five strings. These are plucked to produce the tone, which is remarkably soft and agreeable. Wooden instruments are chiefly used for purposes of noise; two noteworthy forms are a hollow box in which a hammer is swung from side to side, and an image of a tiger with six wooden pegs in his back, which are sometimes played all at once, in the manner that a small boy runs a stick along a picket fence. Bamboo gives rise to pan-pipes, sixteen being bound together to form the siao, and also to flutes. The Chinese flutes have but three holes, thus demanding great skill in the production of tones. An obsolete form, considered the most difficult to

play, had its mouthpiece in the centre, with three holes on each side and the ends stopped up. The calabash, or gourd, serves as an air reservoir into which are thrust a set of reeds, each provided with a tongue of copper or gold. The name of this elementary reed organ is the cheng. The Chinese possess other instruments, probably of foreign origin, among which are trumpets and examples of the guitar or banjo type. Perhaps the most execrable of all is a sort of mallet with strings extending from the handle to the head, inside of which is the sounding-board.

Chinese music, although often overlaid with tremendous din and clatter, is not without its points of interest. The Chinese play in a slow and stately manner, and regard our quicker pieces as undignified. Their love for their own music is wide-spread as it is sincere. Music plays its part in religious festivals, in the theatre, and in the streets, as with us. On the stage, the music really aims to express the emotions of the characters, — an end which it certainly seems to accomplish in the most emphatic fashion. The Chinese have two scales, corresponding to the white and the black keys on our piano; and by employing both of these, they could reproduce

our music. But they confine themselves to the five-note scale, which is not lacking in beauty, as many old Scotch tunes show. The effect of their limited scale, rhythmic style, and iteration of single notes may be well illustrated by our own tune, "There is a happy land, Far, far away."

The Japanese possess nearly all the Chinese instruments, with slight modifications. Thus in crossing the Yellow Sea the kin and the che become the koto, which has six or thirteen strings. The samisen consists of three strings, which are struck by a plectrum, while the kokiri is an elementary violin with a horsehair bow. That the Japanese also demand noise with their music is shown by the composition of an orchestra of seven performers: one with a large drum, two with small drums, two with little bells, one with a pair of wooden clappers, and one with a flute, the only one of the seven who could give more than a single tone. It is perhaps as unfair to call this representative as it would be to take our own street bands as a type of our music. Another orchestra, for example, this time playing for the mikado, consisted of a straight flute, a pipe, a traverse flute (held sidewise), and a cheng,

besides the small and large drum that seem to be inevitable among the Orientals. It is worthy of note, however, that the Japanese are at present rapidly adopting our own musical system.

The chief musical instrument of India is the vina. Although mentioned as a lyre by ancient writers, such as Pliny and Pausanias, it belongs rather to the guitar type. It consists of seven long metal strings, tuned at rather large intervals apart. The body of the instrument is of hollow bamboo, with a gourd at each end to increase the resonance. It has a finger-board like a guitar, with frets which are not permanently fixed, but stuck on by the performer with wax. Its tone is both full and delicate, and it is well adapted for rapid and brilliant passages. The natives have at all times admired this instrument greatly, and good performers on it have become renowned. Especially famous was Djivan Shah, who flourished in the seventeenth century, and who seems to have been to the vina what Paganini was to the violin. Other Hindoo instruments are the ravanastron, a two-stringed violin, the serinda, provided with three strings of spun silk, and played with a simple bow, and the magoudi, or guitar; but these are less popular than the vina,

and were possibly imported from Persia. Flutes, drums, bells, and gongs are also found among the ancient Indian instruments.

Among Arabian instruments, the rebab has already been mentioned as the probable origin of

DJIVAN SHAH PLAYING VINA

our violin. Other important instruments of this nation were the lute, the tambour, the monochord, the stringed instrument called canon, the dulcimer, with strings tuned in sets of three, the zamar, or oboe, the kettle-drum, the nefyr, or trumpet, and various flutes. The ancient Greeks gave

high praise to the Arabian instruments, evidently with good reason. European instrumental art to-day owes much to the Arabs. If the rebab was not the origin of the violin, its adoption by the trouvères at least caused the spread of bowed instruments in Europe. The dulcimer has undoubtedly given rise to the piano. Our oboes are almost exact copies of the zamar, while our drums and trumpets also are close imitations of the Arabian models. The presence of the Saracens in Spain and the voyages of the Crusaders to Palestine gave ample opportunities for such imitation, and the European nations have certainly profited by them.

The existence of flutes in ancient Egypt has already been alluded to. Very much in use also was the harp, and primitive instruments of the guitar, mandolin, and lute types were also employed. The lyre was in use as early as the eighteenth dynasty. Among the percussion instruments were small wooden clappers, hand-drums, and larger drums with sides of baked clay ; also the sistrum, a set of metal bars which were shaken rhythmically. The Egyptians seem to have employed these instruments in many orchestral combinations, although the pictures on

the ancient monuments do not and cannot inform us whether the musicians played in harmony or merely in unison.

The ancient Hebrews can lay no claim to invention in musical fields. Their instruments, so far as known, were almost entirely borrowed from other nations; but the whole subject of Hebrew music is involved in obscurity. Their kinnor, or harp, was probably a lyre. The neble, or psaltery, was a species of dulcimer. The asor, referred to by David as an instrument of ten strings, was a sort of lyre played with a plectrum. The timbrel, or tabouret, was a small hand-drum, or tambourine, probably of different sizes. Cymbals were known, also trumpets and flutes; probably also the guitar, the pipe, and the sistrum. Organs consisted of simple sets of pan-pipes. One of these, made of ten pipes, was set up in the Temple at Jerusalem. Each pipe gave ten tones, and so powerful were they, the Talmud relates, that when the organ was played the people in the streets of Jerusalem could not hear each other talk, and the sound was audible ten miles away. But the name of this tonal wonder, magrepha, meant also fire-shovel, such as the one used to build the sacrificial fires and then thrown to the

ground with a loud noise. Other authorities have contended that the story referred to an immense drum. In any case, it explains our lack of definite knowledge on the subject, and illustrates the exaggeration of Oriental writers. Another very substantial anecdote is found in Josephus, who mentions a performance by two hundred thousand singers, forty thousand sistrums, forty thousand harps, and two hundred thousand trumpets.

Greece had few instruments, but made up for this lack by skill in using them. First in importance came the lyre, known in a somewhat smaller form as the kithara. This instrument was too much admired to be ascribed to any one less than a god, and the Homeric myth runs that Hermes, in the form of a young child, wandered forth and found a tortoise-shell, which he took back with him. From the shell he made an instrument by stretching over it seven strings. But Apollo, enraged at Hermes for having stolen his cattle, approached in anger. The pretended innocence of Hermes did not deceive his pursuer, so the guilty god gave up the lyre in recompense, and Apollo, striking it with a plectrum, invented music.

Almost as popular as the lyre were the Grecian flutes. These were of many kinds, single or double, and were often reed[1] instruments rather than true flutes, which possess no vibrating material. Flute-playing was considered part of a

GREEK CONCERT

boy's education, and in the Pythian games prizes were offered for excellence in this accomplishment. It is related that at one of these contests a flute-player won the prize in a singular manner. He was playing a straight flute, when the reed

[1] The term "reed instrument," as here and afterward used, signifies an instrument that has a vibrating reed tongue in its mouthpiece.

in the mouthpiece became closed by accident. Instantly changing the position of his instrument, he used it as an oblique, or traverse flute. His presence of mind was rewarded by the laurel wreath.

The Greeks had many percussion instruments, which played a part in the revels of the bacchantes. Trumpets were banished from refined music, but had their day at the public games. One remarkable trumpeter, Herodorus of Megara, is said to have gained the prize seventeen times in the contest at the Olympian games. His music was so loud that the audience were sometimes stunned by the noise. He could play two trumpets at once, and when he did so his hearers had to sit farther off, in self-defence. Once at the siege of Argos, when the troops were giving way, he sounded his two trumpets, which so inspired the warriors that they returned to the fight and won the victory.

Roman music, which at first showed some traces of early Etruscan influence, soon became a mere imitation of the Greek art. Instead of the lyre, the tibia, or flute with reed mouthpiece, became the representative instrument. The so-called hydraulic organs, which flourished in

ancient times, were sets of large pipes in which the air-pressure was supplied by some system of water-pressure and cisterns. The absence of bowed instruments was noteworthy, and the use of bows to rub strings was still unknown. History is forced to discard the well-known anecdote of Nero fiddling while Rome was burning. What this cruel but musical emperor really did was to ascend his tower and watch the spectacle, which moved him so much that he burst into music and sang "The Destruction of Troy." Lest he be taken as a text by those misguided modern theorists who are trying to prove a connection between music and crime, it may be stated in passing that Nero's musical attainments were not great, and that the applause which greeted them was largely a matter of flattery, if not of actual compulsion.

In summing up, the student finds that the use of various kinds of musical instruments, and the principles on which they depended, were more or less known by every ancient nation. But the skill or knowledge required to use them in any but the simplest combinations was entirely lacking. True orchestras and orchestral music, in our sense of the word, did not exist. It is

only in mediæval and modern times, and among European nations that the evolution of harmony and counterpoint have made possible the rich and manifold textures of our modern orchestral compositions.

CHAPTER II.

THE GROWTH OF THE ORCHESTRA

After the downfall of the Roman Empire, music was at a very low ebb. The use of instruments was limited in the extreme, and the art was kept alive almost wholly by vocal means. The rise of our music from that of Greece, the work of St. Ambrose and St. Gregory in systematising the modes, the exertions of Charlemagne in the cause of correct singing, the introduction of notation, the reforms and improvements of Hucbald and Guido of Arezzo, the growth of the staff, of measured notation, and of counterpoint, all these important items of musical progress were entirely unconnected with the use of instruments.

The early bards in Wales, Scotland, and Ireland exerted little influence on the growth of orchestras. The strolling players of the Dark Ages, too, were not productive of any instrumental development. It is not until the rise of the

A TROUBADOUR

troubadours, trouvères, and minnesingers, at the beginning of the twelfth century, that we find instruments playing an important part in accompaniments. The life of the troubadour formed an interesting picture in the great mediæval panorama of chivalry. At the first breath of spring, this minstrel knight would sally forth, with his train of jongleurs (accompanists) and pages, and visit some neighbouring castle. Here, after a welcome to which the jongleurs responded with music, a banquet would generally be held, after which came more of the troubadour's compositions, sung and played by the jongleurs either at the table or in a special minstrels' gallery over the main door. The next morning, while the women were taking the air on the castle walls or in the surrounding meadows, the jongleurs would move about and sing as before, while at this point the troubadour might deign to show his own skill, accompanying himself on a guitar.

But it was the jongleurs who became proficient on the various instruments of the time, for the troubadour confined himself largely to composition. Subsisting by their skill, at first under the troubadours and afterward independently, the jongleurs not only considered it a point of

honour to play well, but found it necessary to do so. The jongleur was a man of varied accomplishments, as is shown by the instructions of the troubadour, Girard Calanson. "Learn to act well," his directions run, "to speak well, and to extemporise rhymes well. Learn to invent clever and amusing games to please people. Learn to play on the tabour, the cymbals, and the bagpipe. Learn to throw and catch little apples on the point of knives. Learn to imitate the songs of birds with your voices, to pretend to make an attack on a castle as if you were besieging it, to jump through four hoops, to play on the citall and the mandore, to perform on the cloncorde and the guitar, for they are delightful to all. Learn how to string the viol with seventeen chords, to sound the bells, to play the harp, and to compose a jig that shall enliven the sound of the psaltery."

The best jongleur was he who could play the most instruments. "I can play," says the minstrel, in the Bodleian manuscript at Oxford, "the lute, the violin, the pipe, the bagpipe, the syrinx, the harp, the gigue, the gittern, the symphony, the psaltery, the organistrum, the regals, the tabour, and the rote." Of these instruments

the gigue[1] was a small and high-pitched violin, the gittern a guitar strung with catgut, the symphony probably some form of bagpipe, the regals a tiny folding organ, the tabour a shepherd's pipe, and the rote a small square harp. Stranger than these, however, was the organistrum, a species of lute provided with keys and a wheel. The wheel was kept in motion, the strings being pressed against it by means of the keys. All these, with the flute, trumpet, flageolet, sackbut (trombone), shalm (clarinet), rebeck (a bowed mandolin derived from the rebab), and marine trumpet (not a trumpet, but a large monochord giving a scale from a single string), certainly made a formidable array of instruments.

But there seems to have been no idea of a definite orchestra, until the end of the sixteenth century. In the description of the first performance of Balthasarini's "Ballet Comique de la Reine" (France, 1581), mention is made of hautboys, flutes, cornets, trombones, viole da gamba (large viols tuned in fourths or thirds), lutes, harps, a flageolet, and ten violins. But the musicians were separated into groups, and while one

[1] From "gigue" was derived "Geige," the German name for the violin.

set played, the rest were silent. In Rome, at one of Cavaliere's oratorios, performed in 1600, was an elementary orchestra consisting of a viol da gamba, a harpsichord, a double guitar, and two flutes, with a violin to play in unison with the soprano voice. In the same year Peri's "Euridice," the first opera extant, was produced at Florence, with the accompaniment of a harpsichord, a large guitar, a viol da gamba, and a theorbo, or large lute.

In the performance of Monteverde's "Orfeo" at Mantua in 1608, we find a more extensive orchestra, consisting of two harpsichords, two bass viols, ten tenor viols, one double harp, two small French violins, two large guitars, two wooden organs, three viole da gamba, four trombones, one regal, two cornetti, one treble flute, one clarion, and three trumpets with mutes. In all this early work, the players were allowed considerable latitude. Very little except the actual melody was written, the harmonies being indicated by a figured bass which the performers translated into notes.

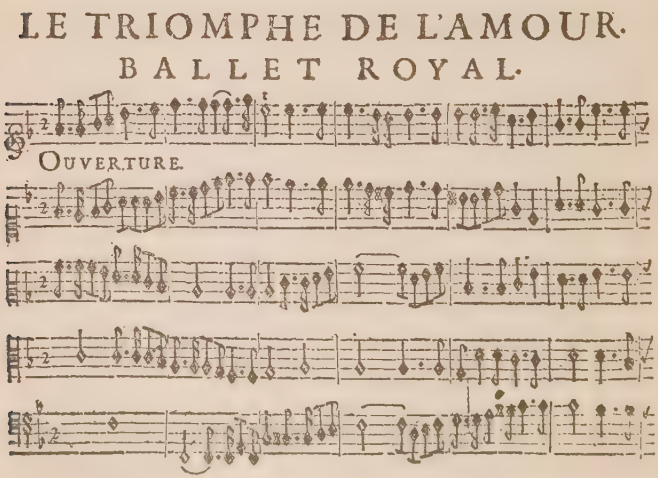
The rapid progress of dramatic work rendered good accompaniments a necessity, and the heterogeneous mixtures of instruments soon gave way

to a more orderly arrangement. At first the chief emphasis was placed on the viols, which were developed from the troubadour fiddle. Viols were of four sizes, the treble or discant, the tenor (viola di braccio), the bass (viola da gamba), and the double-bass (violone). The viols differed from the violin type in having deeper ribs, a flat back, and an inferior quality of tone. With the exception of the double-bass, the viols disappeared from the orchestra in the eighteenth century. But even in earlier times the violins pressed them hard for supremacy, and we find Cavalli, in 1649, accompanying a song in "Il Giasone" with two violins and a bass in almost modern fashion. Stradella, in 1676, used a double orchestra, composed of two violins and a 'cello for accompanying solos, and a large number of violins, tenors, and basses, for filling in harmonies. At about the same time, Scarlatti employed two violins, viola, and bass, using them in exactly the manner that any modern composer would do.

The introduction of the wind-instruments came more slowly. At first they were few in number, and were used merely to reinforce the strings by playing the same melody. But

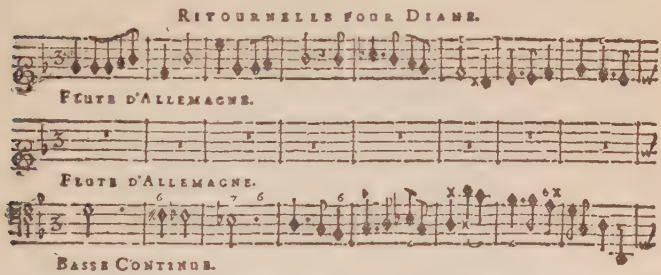
gradually the newcomers in the orchestra were accorded individual rights, and the historian Burney, when in Rome, heard a song of Scarlatti, with trumpet obligato, which proved that the great composer knew the instrument thoroughly.

In France, as in Italy, the growth of opera aided that of the orchestra, but in France the wide-spread popularity of allegorical ballets gave an added incentive to instrumental development. In the works of Lully, the great founder of French opera, we find well-developed orchestral accompaniments, besides overtures of some importance. The archaic quality of Lully's scores is due to the employment of the instruments by

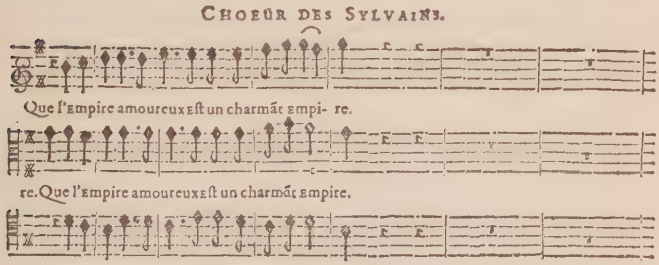


SCORE OF LULLY, FOR STRINGS AND BASSO CONTINUO

groups rather than as a whole, thus producing the effect of a string orchestra at one moment, and a wood-wind band at the next. Yet his part-writing is pleasing and effective, if simple, as



may be seen by the illustrations given. They are taken from the ballet "Le Triomphe de l'Amour," published in 1681, and were played by a string band, two oboes and a bassoon, and



WOODWIND PASSAGES, FROM LULLY SCORE

a combination of flutes, each group being generally supported by a bass on the harpsichord.

Up to this time, all music had been divided

into groups of instruments, one group playing throughout one selection. Any infraction of this custom was contrary to rule, as may be seen by the English term of "broken music," which was applied to such irregular procedure. The gradual use of the wind to support the strings led to more varied effects, but it was not until the advent of the French composer Rameau that the wood-wind was used in free parts to enrich the harmony of the string passages.

In Germany, instrumental music was influenced by the polyphonic school of counterpoint, rather than the representative style of the early Italian opera, which aimed to express the emotions and typify the characters of the piece. Thus the German instrumental writings that culminated in the orchestral works of John Sebastian Bach show many free parts in their scores.

Bach was undoubtedly the world's greatest master in part-writing, but as his audiences did not demand the powerful effects of to-day, and could not continually follow his intricate musical tracery, he often limited himself to very few parts. These simpler passages, introduced for purposes of contrast, as well as the figured

JOHN SEBASTIAN BACH

clavichord accompaniments and the numerous parts for instruments now obsolete, have to be filled in for modern performances. But the original scores, in spite of their limitations, show remarkable purity, symmetry, and consistent orchestral skill. The chief difference between his orchestras and ours, if we except the obsolete instruments, lies in the comparatively small proportion of wood-wind employed in our modern orchestras.

The extraordinary variety of tone-colour at Bach's command is shown by the list of instruments that he used. Among the strings, besides the violins, violas, 'cellos, and double-basses in modern use, we find a violino piccolo, with strings tuned a minor third above those of the violin, the viola d'amore (a tenor viol with seven catgut strings and seven steel strings vibrating sympathetically with them), the viola da gamba, the violoncello piccolo (small 'cello invented by Bach), and the lute. The wind-instruments employed are the old flute-à-bec[1] (straight flute played like a pipe), the ordinary traverse flute,

[1] This is the instrument called the recorders in England, and so beautifully alluded to by Shakespeare in "Hamlet," Act III., Scene 2.

the piccolo, the ordinary oboe, the oboe d'amore (a minor third lower), the oboe di caccia or taille (an alto oboe corresponding to our English horn), the bassoon, the cornetto (a wooden instrument with a trumpet-like mouthpiece, the treble of the now obsolete serpent), two or three horns, trumpets up to four in number, trombones, soprano, alto, tenor, and bass, and kettle-drums; there was also a trumpet with a slide, a horn similarly equipped, and a curved brass trumpet of some sort called the lituus. It must not be supposed that all these instruments were ever used at once, as Bach followed in some degree the old custom already mentioned of grouping his instruments; but they indicate the great variety of effects attained in his music. The use of organ instead of harpsichord to give the continuous bass is a point worthy of mention.

Handel, though skilled in polyphonic writing, adopted a simpler and more direct style in his operas and oratorios. He was acquainted with nearly all the instruments employed by Bach; but he did not use the violino piccolo nor the violoncello piccolo; and he rarely employed the viola da gamba. On the other hand, we find the harp, also the archiliuto and the theorbo, two

varieties of lute which Bach never used. The oboe d'amore and oboe di caccia do not appear at all in Handel's works, and the cornetto only once. The flute-à-bec is rare, and horns and trumpets less common than with Bach. Handel also experimented with the chalameaux, the predecessor of the clarinet. Two harpsichords and two organs were used to fill in the harmonies, the latter of course being employed in the oratorios and not in the operas. It was customary, until the end of the eighteenth century, for the conductor to preside at the harpsichord, although the method of conducting with a baton was undoubtedly used at a much earlier date.

In using the strings, which form the most important group of his orchestra, Handel often adopts the ordinary arrangement, — two violin parts, violas, and basses; though often he has a three-part accompaniment. In the wood-wind group, he employed oboes and bassoons most frequently, sometimes to contrast with the strings, but more often not in independent parts. The oboes usually doubled the violins, while the bassoons played with the basses. Flutes were not often employed, while horns and trumpets were

used chiefly as melodic instruments, and not to fill out the harmony as in modern orchestras. Trombones are seldom found, but when present are admirably used. Although relying chiefly on the strings, Handel often scored passages much more fully, and if he did not write in the style of to-day, he at least anticipated many effects attributed to later composers. His scores, however, as well as those of Bach, have to be altered at present, because of their obsolete instruments and the figured harmonies of their organ and harpsichord parts.

Haydn has often, and with reason, been called the "father of the modern orchestra." It was he who first banished the obsolete instruments found in the works of his predecessors; in his scores we find nothing that is not still in use; and he was in a great degree the inventor of orchestral colouring, as that term is now understood. His methods have been improved and extended, rather than changed, by his successors. He unquestionably laid the foundation of the modern science of instrumentation. It has sometimes been said that he owed much to Carl Philip Emanuel Bach, second son of the great Bach; but in the works of Emanuel Bach there is none

of the systematic colouring found in those of Haydn.

Haydn's earlier works demand — besides the strings — flutes, oboes, bassoons, horns, trumpets, and kettle-drums. In his later works the clarinet appears, though it remained for Mozart to give this instrument its proper importance in the orchestra; and in his oratorios trombone passages are found. The contrabassoon, the piccolo, and the English horn occur in places, but form no part of the regular orchestra.

The different stages of orchestral combinations up to this point may be briefly enumerated as follows:

1. A complete string band, consisting of two violin parts, violas, violoncellos, and contrabasses.

2. A string band, with wind-instruments playing in unison with the string parts.

3. A string band, with wind-instruments supporting it in free parts.

4. A string band, with wind-instruments playing in separate passages.

5. A string band, with a complete wind band both supporting and contrasting with it.

All of these forms were included in the orchestra of Haydn, and the skilful use and combination

of them has produced the great orchestral effects of to-day. The constitution of the later classical orchestra, suited for the effective performance of the works of Haydn, Mozart, Beethoven, Weber, Cherubini, Spohr, or Mendelssohn, is about as follows: a string band of six to twelve first violins, six to twelve second violins, four to eight violas, four to eight violoncellos, four to eight contrabasses; a wood-wind division of two flutes, two oboes, two clarinets, and two bassoons; and a brass group of two to four horns, two trumpets, and three trombones, with two kettle-drums.

An orchestra consisting of these instruments was until recently considered sufficient for all practical purposes, but many other instruments were introduced for special effects, and a number of these have come to be regarded as an integral part of the most modern orchestras. A partial list of these includes the piccolo (a small, shrill flute), the English horn (a deeper oboe), the basset-horn (a tenor clarinet), the bass clarinet, the contrabassoon, the cornet, the bass trumpet, tenor, bass and contrabass tubas (deep brass instruments), the contrabass trombone, the harp, military drums, and cymbals. Piano and organ are also used in combination with the orchestra.

But before describing these instruments in detail, it may be well to note briefly how the later composers handled their orchestra.

Mozart differed from Haydn in using greater warmth of colouring, and a richer treatment of the wind-instruments. The trombone was still used sparingly, though the impressive passages in the finale of "Don Giovanni" showed that the composer understood its effect.

Beethoven stands out as the foremost figure in musical history, and his skill in orchestration is no less remarkable than his happy blending of intellect and emotion in his music. In speaking of the literary greatness of the Elizabethan age, Professor Barrett Wendell states that the period of greatest glory in any art usually comes at a time when its methods and possibilities have been fully grasped, but its limitations not yet felt. Such a period was the classical epoch in music, of which Beethoven stands as the representative. Although modern writers have gone beyond him in complexity and richness of colouring, his works still stand as models of orchestration, and hardly a passage is found in all his scores which would be improved by any change. Each instrument, with him, is individualised, and its possibilities

brought out in a variety of ways that were wholly unknown to his predecessors.

Another composer of this period, Cherubini, is deserving of the highest praise for his orchestration. His music is undeservedly neglected at present, perhaps because of the contrapuntal (multiple-part) treatment of his instruments, perhaps because of his reserve in producing his effects. But his works are models of purity, and in their simple beauty remind one of the masterpieces of ancient statuary.

The works of Schubert are rich in colouring, but imbued with a delicacy that is far different from the broader and coarser effects of to-day. His scores were not published until recently, but at least one modern composer, Johannes Brahms, has been greatly influenced by them.

Weber's orchestration was essentially dramatic, and abounded in effects of characterisation, different instrumental colours being skilfully used to portray the different scenes or actors in his operas. Especially noteworthy was his increased use of the brass instruments, — productive of many exaggerated effects in modern times, but adding rare charm to his works, as the well-known horn quartette of "Der Freischütz" will show.

Mendelssohn was a worthy master of classical instrumentation. Every bar of his works shows the most finished care, and if there is some dispute about the rank of his compositions as music, there can be none about their orchestration. Especially noteworthy is his skilful use of organ and harp in combination with orchestra.

Schumann, deeply intellectual and emotional in his music, is on the contrary less happy in orchestration. He frequently doubles his parts in unison until the tone-colour becomes turbid. Occasionally he creates some good orchestral effects, but his scores as a whole are not to be compared with those of Schubert, Weber, or Beethoven. He was essentially a piano composer, and all his works are pianistic in style.

Passing over the occasional richness of Rossini, and the piquancy of Auber, we come to that great French exponent of dramatic opera, Giacomo Meyerbeer. He went even farther than Weber in efforts to individualise his characters, and he often allotted single instruments to each. His scores show richness of colour combined with clearness of harmony, an effect which he attained by doubling the parts in octaves instead of unison.

Hector Berlioz possessed an extraordinary feeling for tone-colour, and was remarkably fond of experimenting to find new combinations, in which he was not always successful. His scores show a largeness of musical thought, combined with an exactness of detail (Wagner said of him that he ciphered with notes), but they make exorbitant and often whimsical demands for a needlessly large number of instruments. He was the first to use violin harmonics in full harmony, and to employ the deep pedal tones of the trombone. In his requiem he calls for eight pairs of kettle-drums, and obtains full chords upon them.

Richard Wagner was the first exponent of the real modern richness of orchestral colouring. In this particular his works, especially "Lohengrin," the "Ring," and the later music-dramas, are absolute revelations. Compared with the works of his predecessors, Wagner's scores show not only a more skilful use of their orchestral colours, but such varied and wonderful originality that he seems comparable only to an artist who has discovered a newer and more wonderful spectrum than our own set of colours. One never feels the experimental character with Wagner, as one

sometimes does with Berlioz. In making the Bayreuth orchestra of 1876, when he had thousands of men ready to do his bidding, Wagner chose as instruments sixteen first violins, sixteen second violins, twelve violas, twelve 'cellos, eight double-basses, three flutes, one piccolo, three oboes, one English horn, three clarinets, one basset-horn, three bassoons, one double-bassoon, three trumpets, eight horns, three trombones, two kettle-drums, one bass trumpet, two tenor tubas, two bass tubas, one contrabass tuba and contrabass trombone, six harps, one bass drum, and one pair of cymbals. It must be kept in mind that this orchestra was hidden from the audience, and therefore lost much of the overpowering force with which Wagner's music is too often given in other places.

Wagner's emphasis on orchestral colouring was eminently suited to the stage, where the orchestra gives no definite composition in strict form, but is used rather to reflect and intensify the dramatic situation. But since his day there has gradually arisen a set of composers who have adopted his methods for the symphonic stage. The result is that much of our modern music relies wholly on instrumental and harmonic col-

ouring, and lacks coherency of thought. This entire school will be found by posterity to have little or no real value, unless the composers awake to the fact that such colouring is a means rather than an end. Many living writers, especially in Russia, employ the orchestra with a breadth and surety that equals that of their great original, Wagner, but few of them put into their works anything like the actual thematic idea that underlies Wagner's colouring, while as a matter of fact the concert-room should demand even more form and balance than the operatic stage. Musical impressionism has run wild, and not until the fever has abated so as to permit some restriction of its use may we hope for results of permanent value.

The greatest of all orchestral writers is the German, Richard Strauss. With musical ideas that are at times arbitrary and uninspired, and seldom clear enough to be effective, he unites a mastery of orchestral resource that is almost incredible. Not to be mentioned in the same breath with Wagner in wealth and beauty of themes, he actually surpasses him in the power of portraying an emotion upon the orchestral canvas, — a thing that was deemed impossible

for three decades. His work represents the most extreme point yet reached by those who have devoted themselves almost wholly to instrumental emotion-painting.

CHAPTER III.

THE VIOLIN

The violin, as already intimated, may have had its origin from several instruments, — the rebab of Arabia, the ravonastron of India, the crwth of early Wales, or the crude instruments of Africa. Its use by the troubadours, in the form of a fiddle (fidicula, string instrument), gave rise to the viols, which in their turn were replaced by the violin in its present form. Among the earliest of the famous makers of this instrument were the Amati family, who flourished in Cremona. Andrea, the pioneer, was born in 1520. His two sons, Antonio and Geronimo, continued their father's work, but it was under the hand of Niccolò, son of Geronimo, that the Amati violins reached their greatest development. Still more nearly perfect did the instrument become through the work of Niccolò's pupil Antonio Stradivarius (1650–1737), the greatest of all violin-makers. Another famous family was that of Guarnerius,

of whom Joseph (1683–1745), surnamed Del Jesu, grew renowned because one of his instruments was used by the great Paganini. The worth of these old instruments came partly from the care exercised in obtaining the proper model, the use of thoroughly seasoned wood, and the employment of a special kind of varnish; but their excellence is due largely to their age, for the constant use of a violin tends to set its material so that it will respond more readily to vibrations, and give a richer, mellower tone. That age is not the only requisite, however, is proved by the worth of some modern instruments, such as those of Vuillaume in Paris, and Gemünder in New York. It is said that some of Gemünder's violins, when exhibited in Germany, were refused a medal because their fulness of tone made the judges think that they were old violins marked over for the occasion. The maker afterward convinced the judges of their genuineness, and received the prize.

The integral parts of the violin are the body and neck of the instrument (of maple or pine wood), the bars on which the strings rest (ebony), the bridge of wood that holds the strings up and transfers their vibrations to the body, or sounding-

box, and the strings themselves. These strings are nominally made of catgut, but in reality the cat does not enter the instrumental field, and it is the sheep or goat who furnishes the material. With the instrument come also the bow of horsehair, and a metal plate called the mute, or sordino.

VIOLIN

The strings of the violin are four in number, the lowest one being wound with fine wire to increase its weight. They are tuned in fifths, beginning with the G below middle C of the piano. The open strings thus give G, D, A, and E, while intermediate or higher tones are obtained by stopping (pressing) one of the strings with the finger, thus altering its length.

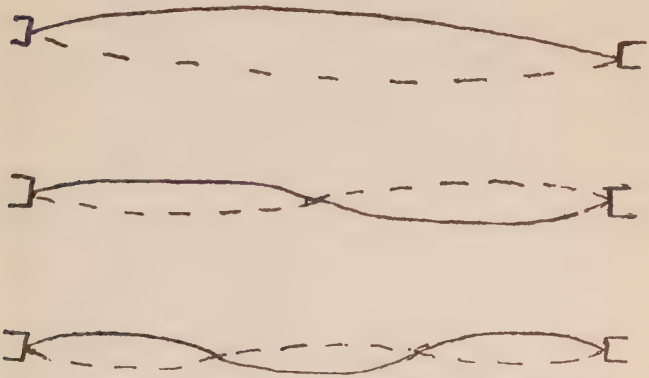
The laws governing the rate of vibration produced by stretched strings were first formulated by the Greek philosopher Pythagoras, who prob-

ably obtained them from ancient Egypt. He discovered that, with all other conditions equal, a higher tone (higher rate of vibrations) was obtained as the string was shortened. The proportion is a direct one, or as we express it, an inverse one compared to the lengthening of the string. The rates of vibration in the ascending diatonic scale of his system, for instance, increased in the successive ratios of 9-8, 10-9, 16-15, 9-8, 10-9, 9-8, and 16-15. It will be noticed in the scale that the whole tones from 2 to 3 and 5 to 6 are a trifle smaller than the others, while this difference does not exist in our altered (tempered) scale of to-day. The change was practically introduced by John Sebastian Bach, who divided the scale into twelve equal semitones, to facilitate modulation, which was too much restricted by the old system, or the so-called scale of nature. By combining tones and semitones to produce larger intervals, we find that the ratio of increase of vibration for an upward interval of a minor third is 6-5, a major third 5-4, a perfect fourth 4-3, a perfect fifth 3-2, a minor sixth 8-5, a major sixth 5-3, a minor seventh 16-9, a major seventh 15-8, an octave 2-1, and so on. The length of string needed to give these intervals varies in an

inverse ratio, as for instance 5-6 the length to raise the tone a minor third, 4-5 for a major third, 3-4 for a perfect fourth, 2-3 for a perfect fifth, 1-2 for the octave, and so on. Thus if the violinist wishes to play the fourth above his open string, he must place his finger upon it at such a spot that the bow can only agitate 3-4 of its length, thus producing vibrations at 4-3 the rate of speed, and giving the note required. There are no frets or marks on the violin to guide the performer, but practice enables him to judge his lengths of string with perfect accuracy. A skilful performer will often produce good effects by making small variations in the length required by theory. Thus if he wishes a tone to sound brilliant, he may sharp it by placing his finger a little nearer the bridge than necessary. This is often done, especially when the tone so sharped leads into the next higher tone. The accuracy of fingering must be so thorough and so automatic that some violin-players dislike to touch a viola, for example, on which a different distance of fingering is required.

Besides having the string vibrate throughout its whole length, it may be made to subdivide and vibrate in sections, as shown in the accom-

panying diagram. These sections are called segments, and the points between them, where the string is at rest, are called nodes. The segments, being shorter than the whole string, give higher tones. The simplest segments consist of the two halves of the string, which, according



STRING VIBRATING AS A WHOLE, AND IN SEGMENTS

to the numerical ratios, give the octave above the open string. A segment one-third of the total length gives the fifth above that octave, while still smaller segments give still higher tones. The tones produced by these segments are called overtones, harmonics, or in Germany flageolet tones, and their successive pitch, with the length of segment, is given below,

taking as fundamental the lowest note of the violin.[1]

In the example given above, the performer, by cutting off 1-4 of the string with his finger, allowed the other 3-4 to vibrate, thus obtaining vibrations at 4-3 of their former speed, and producing a higher tone. Suppose now that, instead of pressing his finger down firmly, he merely touches the string lightly. The result will be

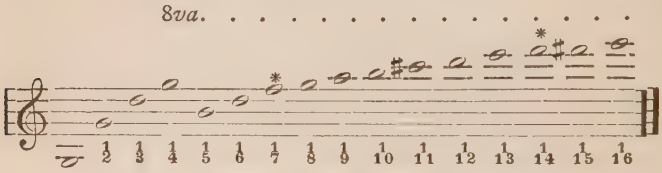


TABLE OF HARMONICS

that, instead of wholly cutting off 1-4 of the string, he will form a node at this point, and the string, if skilfully bowed, will subdivide into fourths, each single segment vibrating, while the nodal point at his finger remains quiet. Thus instead of 3-4 we have 1-4 of the string giving its tone, and the vibrations are therefore quicker in the ratio of 4-1, and not 4-3 as before. As seen from the table, he thus obtains a tone two

[1] Those harmonics marked with an asterisk (*) are out of pitch with our scale, being a trifle too flat.

octaves above the open string, instead of merely a perfect fourth above it.

The playing of harmonics is one of the points where the performer shows his greatest skill. He must be accurate in fingering and steady in bowing, otherwise this tone, thin and clear when pure, will break at once into a series of meaningless squeaks. Of great difficulty, also, is the playing of the so-called artificial, or stopped harmonics, in which the string is pressed down by one finger, while the shortened string is then subdivided into harmonics by a light touch from another finger. The use of thin strings aids in the production of these tones, and Paganini, the greatest of violinists, who took advantage of this fact, was able to produce harmonics up to the twelfth of the series.[1]

The compass of the violin, in Beethoven's time, was considered to run from its lowest string to what is known as three-line A, — one tone over three octaves. But since his time these limits have been passed, and Wagner, in depicting the Holy Grail in its celestial abode (prelude to "Lohengrin"), has written har-

[1] Kaenig, the great acoustician of Paris, has produced harmonics as high as the eighteenth, by the use of thin wires.

monics for four solo violins in the highest position, combined with three flutes.

The ordinary style of the violin is a smooth, melodic legato, in which the composer joins with a slur the notes which are to be played by a single stroke of the bow. In solo playing, there are many technical points by means of which artist or composer may vary and embellish the ordinary legato of the instrument. Double-stopping, or the playing of two simultaneous melodies on two adjacent strings, is comparatively easy. So, too, are arpeggio effects, in which a quick sweep over three or four strings produces a chord-like effect. It is said that Ole Bull, in order to produce actual chords on his violin, had a special bridge made, with its top less curved than usual, so that by pressing hard with the bow he was able to touch three strings at once.

In orchestral work, double-stopping is replaced by a division of the forces into two or more parts. For example, in the "Waldesweben," of "Siegfried," where Wagner wished to picture the myriad sound of the forest, with its bird-calls and rustling leaves, he divided his first violins into three parts, with a solo violin

besides, while the second violins (exactly like the others, but taking a lower part) played in four distinct parts, the other strings also playing *divisi*. It may be stated in passing that this distribution of instruments, here and elsewhere in Wagner's scores, produces a much broader and more massive effect than the older method of scoring for unison parts.

The violin tremolo, so effectively used to depict agitation or suspense, is produced by moving the bow rapidly to and fro upon a single position, by an easy swing of the wrist. Its dramatic possibilities were recognised at an early date, for Monteverde, in the beginning of the seventeenth century, introduced this effect into his operas. Possibly he might have been tempted to refrain from inventing it, had he foreseen the overuse that the modern melodramas would make of it.

Staccato tones are produced upon the violin in various ways. One effective method, in which the notes are marked "détachée" or "martellato," interrupts the tone by a pause of the bow while pressed upon the string. A peculiar, rippling effect, the "flying staccato," called also "arco saltando" or bounding bow, is produced

by allowing the bow to drop upon the string and rebound by its own elasticity after each note.

Sometimes the bow is discarded and the violin strings plucked like those of a guitar. This effect is called "pizzicato," and is one of the most skilful orchestral touches upon the violin. It is frequently used to picture mystery, or to accompany a melody in guitar fashion, the latter instrument not being permitted in the orchestra. To indicate the end of the pizzicato passage, and the resumption of the bow, the composer must write in his score the words "coll' arco," or simply "arco." Skilful solo performers have been known to give a combined effect of pizzicato and bowing, using a free finger of the left hand to pluck the string. The pizzicato, as well as the tremolo, is due to Monteverde.

Less pronounced and clear, but somewhat similar in effect, is the tone produced by tapping the string with the back or wooden part of the bow, — called "coll' legno," or with the wood. The result thus obtained is used — very rarely — in orchestral work alone, being too light for solo passages.

The mute, or "sordino," already mentioned, is a thin tongue or clamp of wood or metal with

three prongs. When used it is placed upon the bridge, which is clasped by the prongs in such a manner that it can no longer vibrate freely. The vibrations of the strings, therefore, are largely prevented from reaching the body or sounding-box of the violin, which gives the chief resonance to the tones. The result is a softened tone, peculiarly thin and sweet in quality, and much used in passages where effects of pathos or tender simplicity are desired. "Con sordini" is the term used to indicate the employment of the mutes, while "senza sordini" indicates their removal from the bridge. Of course a short interval of time must be allowed, in the score, for each of these operations, and the performer must always have his mute at hand or in some convenient pocket.

Embellishments of various sorts—runs, turns, mordants—are in constant use for the violin, their ease being dependent on the skill which the performer can put into the fingers of his left hand. Trills are simply produced, by constantly releasing and stopping the string with one finger, while holding it firmly all the time with another. A much-used solo effect is the glissando, in which the performer changes the tone by sliding

his finger from one position to another, instead of stopping the string at once in the required place. The glissando is always noticeable, and is frequently overdone by young artists.

A special kind of tremolo, called the "vibrato," is produced by stopping the string firmly and swinging the wrist of the left hand. This does not interrupt the tone, like the ordinary tremolo, but produces a series of alternate swells and subsidences in the tone that are very expressive.

The fingering of the violin is taught by means of different positions of the left hand. The thumb is always under the neck of the violin to support it, leaving four fingers free. Thus on the G-string, in the first position, these fingers produce the notes A, B, C, and D. But by moving the entire hand along to the second position, B, C, D, and E are produced. The higher positions are frequently used, and are necessary in getting high tones from the upper string. Eleven positions are practicable, but of these only seven are in general use.

The point at which the strings are to be bowed is a matter of some importance. The formation of harmonics by the subdivision of the string,

already explained, tends to take place whenever the string is vibrating as a whole also;[1] just as a long rope, hanging loosely, may be given a slight jerk and be made to vibrate in little segments at the same time that it swings to and fro as a whole. The formation of many of these overtones produces a piercing quality of tone, while their absence causes a hollowness. By bowing toward the middle of the string, the chief overtones are prevented from forming, while by agitating the strings very near the bridge the higher overtones are brought into prominence, giving a peculiar, squeaky effect called "sull' ponticello." In pizzicato passages, the string must always be plucked some distance away from the bridge, as otherwise the tone will be too sharp.

The violin is beyond doubt the most important instrument of the entire orchestra. The first violinist, "concert-meister," as he is called,[2] is

[1] To illustrate by experiment the formation of harmonics, lay light pieces of paper on all the wires of a piano. Then press the pedal and hold it down, at the same time playing one of the lower notes. The papers will be thrown off by those wires which vibrate in sympathy (unison) with the tones of the harmonic series belonging to the note played.

[2] In England he is called the leader, and in France *chef d'attaque.*

next in rank to the conductor himself, and should be able to replace the latter if necessary. He should be a performer of the highest merit, able to play the obbligato passages that occur frequently in modern scores.

The violin is capable of expressing every emotion, from the deepest pathos to the wildest merriment or the utmost frenzy. Its use in the orchestra is therefore varied, extensive, continuous. In drawing the distinction between those instrumental tone-colours which are natural and those which are merely arbitrary or the result of association, the violin remains entirely in the first category. It lends itself naturally to the melodic expression of every shade of feeling, and while other instruments show certain distinctive effects of tone-colour, the violin possesses them all.

Besides the usual methods of tuning and playing the violin, many special effects have been obtained by departing from the general practice. St. Saëns, for example, in his "Danse Macabre," which depicts the skeletons dancing in a graveyard at midnight, tuned a solo violin to the tones G, D, A, E-flat. The result of lowering the first, or upper, string was the formation of a diminished fifth which gave a peculiarly bizarre

effect when Death began to tune the violin with which he accompanied the dance. Paganini, on many occasions, tuned his violin a semi-tone too high, and transposed the music a semitone downward when performing it, thus obtaining tones more brilliant than those given by the usual tuning. Other artists who have produced special effects of their own by altering the tuning are Barbella, Lolli, Baillot, and Tartini.[1]

Violin-playing dates back nearly to mediæval times, but it first attained prominence in the seventeenth century. The introduction of the violin into the church service, first to play in unison with the voices, then to accompany them, and finally as a solo instrument, gave it its real importance. About the year 1630 there began to appear crude examples of the classical violin

[1] An anecdote relates that the German violinist Strungk, famous also as one of the early opera-composers, once visited the great Corelli for the purpose of hearing him play upon the instrument. When the Italian master had finished, he politely asked his guest to play. Strungk, after demurring, played a short piece in a purposely careless manner, whereupon Corelli gave him some friendly advice and said he might become a good player in time. Strungk then proceeded to astonish his host by putting all the strings out of tune, after which he played with the most amazing brilliancy, correcting the false pitch of the strings by skilful fingering. The astounded Corelli cried, "Sir, they call me Archangelo, but you must be an Archdiavolo."

sonata, — an alternation of slow and quick movements. Soon afterward two forms were recognised, — the church sonata, consisting of a prelude, an allegro (fugato), a slow movement, and a brilliant finale; and the chamber sonata, really a suite of dances, in which the stately sarabandes and allemandes alternated with the more lively gavottes and gigues.

In Italy, at this time, it was customary for great composers to be great violinists also, just as to-day nearly all our composers are great pianists. Vitali deserves mention as the first of the series, while Torelli must also be included as the inventor of the violin concerto. But the most famous name of the generation was that of Arcangelo Corelli, who gave to violin composition and playing the dignity and value that it has held ever since. Of even greater merit, however, was his successor, Tartini, who showed more poetical feeling in his compositions, and introduced many improvements in the technical use of the bow.

France and Germany possessed some sporadic violinists, but it is to Corelli and Tartini, or rather to the pupils of these renowned artists, that the two nations owed their development. In France, the first great success came to Leclair,

who was taught by Corelli's pupil Somis. But toward the end of the seventeenth century, Viotti, a more famous representative of the classical Italian school, came to Paris, and with such artists as Kreutzer, Rode, and Baillot, placed Paris far in advance of all other cities in the matter of violin-playing. The German performers, taught by Tartini's pupils, still clung to the older style, but for more dramatic works, such as those of Beethoven, the breadth and power of the Paris school were required.

The man who first introduced this broad style into Germany was Ludwig Spohr. Not only did he open the eyes (or perhaps the ears) of his countrymen to the worth of this style, but he elevated the violin concerto to the rank of a worthy art form, instead of the more or less popular display-piece that it had been in the hands of the French writers.

Meanwhile Italy, after losing the sceptre of classical preëminence, produced only scattered examples of her former greatness. But among Italian artists of the early nineteenth century is to be found one who was by all odds the greatest technical master of the violin that the world has ever seen, — Niccolò Paganini. The story of his

life is one of absorbing interest, and the misfortunes and persecutions that followed him, as well as his marvellous talent and strange personality, make his biography read like a romance.

Born in 1784, his early youth was spent under the severe rule of his father. Parental harshness would undoubtedly have caused him to turn from music, but for his own innate love for it. The long practice that he was forced to take, and the many hours he would spend voluntarily in mastering some new difficulty of his own invention, are responsible for his great talent, and not any fanciful secret, such as he himself, in his later days, proposed to reveal in one short violin study. Yet it is a strange fact that Paganini was able to impart to his pupil Catarina Colcagno, who was only fifteen, a brilliancy of style that astonished all Italy.

After leaving the parental roof, he wasted much time and money in gambling, but was finally brought into steadier habits by losses which almost forced him to sell his violin. Three years of his life were spent in devotion to the guitar, a whim caused by his infatuation for a rich and noble Italian lady who admired that instrument, and at whose castle Paganini

NICCOLO PAGANINI

stayed. But after this episode he returned to the violin, and we soon find him at the court of Princess Eliza, at Lucca. It was there that he began to show a predilection for the use of single strings. This habit arose from his admiration for one of the ladies in his audience, for whom he composed and played a love-dialogue on two strings, the first and the fourth. His great facility on the G-string dates from this period, though it was not until some years later that the breaking of the E-string forced him to perform more difficult four-string pieces with only three strings.

To show the malice with which his enemies pursued him, it is only necessary to relate the story they spread, that Paganini, having murdered his rival in the presence of his mistress, was condemned to prison, where he passed eight years. He was allowed to keep his violin, the calumny ran, but owing to the dampness of the cell all the strings but the lowest one broke; hence his great facility upon it. The slightest investigation proves this story not only false, but impossible. From the date usually assigned, the crime must have taken place in his seventh year if at all. But he remained with his father until

the age of fifteen, and with the exception of the guitar period was constantly before the public after that. Yet the story persisted. Even to-day innocent men are sometimes made the victims of waves of popular persecution; but a century ago, among a credulous race like the Italian peasantry, the violence of such delusions must have been enormous.

Paganini's wonderful technique gave rise to the story that he was aided by the devil, and some accounts actually record that that satanic gentleman was seen standing by the violinist. Paganini's great height, excessive paleness, and brusque manners certainly made him a strange personality, but were in no way responsible for the libel that sought to deprive him of the credit of his skill. That this skill was almost beyond belief is admitted by all his audiences, and proved by many anecdotes. On his arrival at Naples, for instance, envious artists who doubted his greatness engaged the young composer Danna to write a piece bristling with difficulties, which was to be played at sight by the newcomer. Understanding the snare set for him, Paganini gave the merest glance at the work, and played it off with the utmost ease.

EUGENE YSAYE

His death occurred in 1840, after long illness. Some accuse him of youthful excesses, while others call him the victim of a quack medicine which he used for many years. His body was refused burial at Nice, and was transported to Parma, there to be interred near the Villa Gajona.

The school of France and Belgium has given, during the last century, two names among many that deserve especial mention. They are De Beriot (contemporary of Paganini), and his successor Vieuxtemps. Both were masterly technicians, although not of course comparable with Paganini. A distinction is sometimes drawn between the Franco-Belgian school, which is said to be fiery and brilliant, and the German school, which is described as less showy and more musical. But this distinction is rather arbitrary, and the violinists of to-day are not limited by any single school or style. The most famous recent names are Wieniawski and David, while among living performers Joachim has long held the sceptre, but Ysaye now seems to be taking the lead.

The varied violin repertoire of the present hardly needs description. Solos and string

quartets exist almost without number, orchestral scores make greater demands upon the instrument than ever, and the world's best composers have used all their genius in writing concertos for violin and orchestra. Among the great masterpieces of the latter sort Beethoven's single concerto will always remain a model, while Mendelssohn, Brahms, and Bruch (in his G-minor work) have each given the world a noble example of this admirable form.

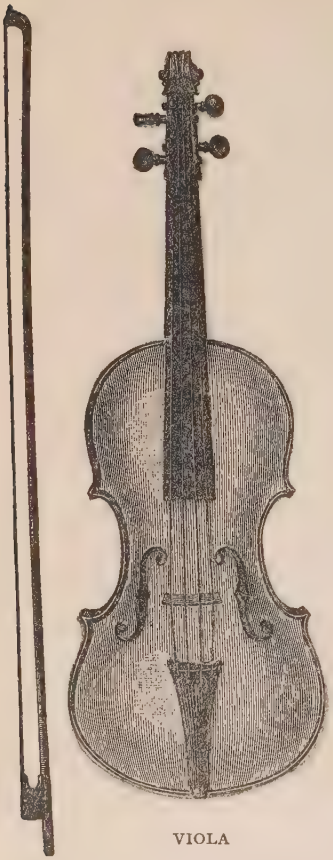
CHAPTER IV.

OTHER BOWED INSTRUMENTS

THE instrument most closely related to the violin is the viola, — called in England the tenor viol, in Germany the Bratsche, and in France the viola alto or simply alto. The viola is exactly similar to the violin, except in being one-fifth larger and having thicker strings. It is tuned in fifths, like the violin, but its heavier strings (the lowest two being wired) give tones a fifth lower than those of the violin, or C, G, D, and A, starting an octave below middle C of the piano.

The playing of the viola is wholly the same as that of the violin, except for the greater stretches in fingering, due to the longer strings. All the technical points of execution are possible upon it, and all the violin positions, but owing to the hollowness of the high tones, positions higher than the fifth are rarely used. This gives to the viola a compass of about three octaves.

The viola part in orchestral scores is notated in the alto clef. The two ordinary clefs, for G and F, are far apart, and between them is a series of four C clefs, all more or less in use. The G clef, which places G on the second line of the staff (middle C on an extra line below it), was used in its present shape as early as 1753, although we find Lully and others placing it on the first line, giving even higher results. First below the G clef comes the C clef on the low line of the staff, called the soprano clef. C on the second, third, and fourth lines gives rise to the mezzo-soprano, the alto, and the tenor clefs. There is no lower C clef, although some old music places the F clef on the third



VIOLA

line, thus bringing middle C on the upper line. This is called the baritone clef, while the F clef in ordinary use is called the bass clef, and is placed on the fourth line, bringing C on the first leger line above the staff.

The distinctive tone-colour of the viola is that of brooding melancholy. This is due to its thick strings, for thin strings are necessary to produce many harmonics along with the fundamental tone. The absence of these harmonics is what causes the dull tone of the viola. An effort to overcome this defect is found in a concerto by Mozart for violin and viola, in which he tunes the latter instrument up a semitone, and writes the music too low by the same interval, — tighter strings always giving more brilliant tones.

The classical orchestra already described is divided into groups of four-part harmony, of which one is formed by the first and second violins, the violas, and the violoncellos. In the eighteenth century, when the composers rarely wrote four real parts, the viola was usually relegated to obscurity. Occasionally it played independently, but almost always the words "col basso" drove it to double the bass part. Viola-

players were of little importance, and were taken from the ranks of broken-down violinists. That Gluck understood the use of the instrument is shown by a scene in "Iphigenie en Tauride;" Orestes, pursued by the furies, sinks down overcome in his prison, but the gloomy muttering of the violas shows that it is not peace of mind, but merely exhaustion, that allows him to repose for a moment. Mozart uses violas prominently in Sarastro's air, "O Isis and Osiris" ("Magic Flute"), Beethoven employs them well in the ninth symphony (3-2 passage in finale), and Schubert also gives them some importance. Beethoven produces a delightful tone in the andante of his fifth symphony by uniting violas and 'cellos. Méhul, to depict the lofty melancholy of Ossianic poetry in his opera "Uthal," has tried the experiment of leaving out the violins altogether, and giving the chief part to the violas. But the result is a little too successful, and the composer Grétry, after listening to the work, exclaimed: "I'd give a hundred francs to hear a violin."

Among more modern composers, Mendelssohn has used the viola skilfully in "Elijah" ("Lord, God of Abraham"), but more famous

is the impressive gloom of the viola melody in the slow movement of his Italian symphony. Berlioz, in his "Childe Harold" symphony, has personified that contemplative hero most exquisitely in a pensive strain for the viola. Brahms has given the instrument not a little prominence, and Rubinstein has composed a sonata for viola and piano. Meyerbeer, in "Les Huguenots," has written an obbligato passage for the obsolete viola d'amore, but this is now given to the viola.

Usually the viola keeps to its rôle of third part in the orchestral string quartet, but excellent results are often obtained by making it at times cross with the second, and even with the first, violin parts. Owing to the stronger tone, fewer violas are needed, and their number is usually one-third of the first and second violins in combination.

There have been various efforts to brighten the viola tone, and give it a less restricted use in the orchestra. Bach's violoncello piccolo was really a larger viola. In recent years, the German Ritter brought out a large viola which he called the viola alta, but the musical world has christened it the Ritter viola. It is half as large again as the violin, so none but men of large

hands and ample proportions can play it, and ordinary orchestras have not adopted it. But its tones are remarkably beautiful, for the length of the instrument allows the pitch to be a fifth deeper than that of the violin without necessitating any thickening of the strings to lower the rate of vibrations. On the ordinary viola, the increase of one-fifth in size lowers the pitch of the strings only a minor third, and the remaining depression, a major third, can be produced only by using the thick strings that give the instrument its dulness of tone.

The fourth part in the quartet of strings is taken by the violoncello. The nature and origin of this instrument are shown in its name, which should always be spelled with an o in the third syllable. The old Italian name for the double-bass was violone, and the smaller instrument was given the diminutive term of violoncello, or little violone. The English name for it is the bass viol. Its size compels the performer to rest it on the floor while playing.

The strings of the 'cello are tuned in fifths, an octave deeper than those of the viola. The two lowest ones are wired, as on the smaller instrument. The fingering is different, owing to the

greater stretch necessary to produce a given change in pitch. Changes in the position of the hand occur as in other stringed instruments, but while in the violin the higher positions were difficult because the fingers were forced close together, here they are easy because the excessive stretch is gradually reduced. The compass of the 'cello is therefore fairly extensive, being three and a half octaves at least. The thumb is often used in fingering, especially in pressing the string while the little finger touches it to produce harmonics.

VIOLONCELLO

The fathers of the early New England Church must have possessed a decided predilection for the 'cello. Usually exercising rigid severity against any innovation in their simple services, they seem to have ad-

mitted this instrument in the eighteenth century, sometimes paying the player as much as $70 a year. Just why they chose this particular instrument is not easy to see; but the fact remains that they looked upon it with favour, while regarding the violin as a device of Satan and the organ as the most utter abomination in the eyes of the Lord.

The tone-colour of the 'cello, like that of the violin, is capable of expressing all emotions. It differs from the violin, however, in having a deeper and more masculine effect. One of the favourite orchestral devices on the part of great composers is the writing of a sort of antiphonal dialogue between different instruments, and the violin and 'cello form a pair perfectly suited for this effect. An excellent example of the alternation of themes between them is found in the slow movement of Beethoven's eighth symphony. In almost all of Beethoven's works, in fact, the various instruments are made to speak out in their most characteristic tones.

With regard to solo execution, all the technical points of violin-playing may be produced on the 'cello. Double-stopping, however, is limited by the size of the instrument, and intervals practi-

cable on the violin or viola are often impossible here. Arpeggio effects and chords, too, must be written with due regard to the size of the human hand, and generally include at least one open string. A series of such chords may be found in Beethoven's overture, Opus 115, written in honour of the Austrian emperor. Tremolo, vibrato, and glissando effects are easily produced. The mute, or sordino, can be well employed upon this as upon the smaller instruments. Especially telling is the pizzicato, as the long, heavy strings of the 'cello give a full tone when plucked. Arco saltando and other bowing effects are perfectly practicable. The harmonics of the 'cello are of good quality, for while as a rule thick strings do not subdivide easily, their extreme length on the 'cello offsets this disadvantage. On the upper string harmonics are especially pleasing, resembling muted violin tones in quality. Owing to the length of the strings, the second stopped harmonic cannot be produced; but the third, two octaves above the open or stopped string, is much used, and the higher ones are easily obtained when needed. They are little used in orchestral work, though Verdi, in the Nile scene of "Aïda," has employed them with notable effect.

In orchestral scores, the low notes of the 'cello are written in the bass clef. At present the upper notes are given in the tenor clef, with only the very highest tones in the C clef. In former times, however, it was customary to use the G clef instead of the tenor clef, with the tones sounding an octave lower than written. In reading old scores, allowance must always be made for this point. Besides taking the bass part in string quartets, the 'cello usually retains this position in the string band of the orchestra, playing in company with the double-bass, which sounds an octave deeper and forms the bass of the entire orchestra. The 'cello adds smoothness to the tone of the deeper instrument, just as the viola did to the 'cello tone in the andante of Beethoven's fifth symphony. Besides, it can play in quicker tempo than its deeper relative, and can thus vary the effect produced. In cases where a light effect is desired, the 'cello may take the bass part alone, as in the scene of Agatha's prayer in "Der Freischütz."

The 'cello is by no means limited to this drudgery, but frequently has an independent part. Schubert, in the andante of his great C-major symphony, divides his 'cellos into two

parts. Cherubini, in the soprano *scena* at the opening of his "Faniska," writes three real parts for the instrument. Rossini, in the overture of his "William Tell," scores a long passage for no less than five solo 'cellos, though this is now generally arranged for one. Wagner, the great master of divided orchestration, does not hesitate to apply this method to the 'cellos, writing as many as five parts at times in "Die Walküre," and four, with other strings *divisi*, in "Siegfried." In combination with the voice, the 'cello is especially effective in obbligato parts, and its use in this manner in the air, "Be thou faithful unto death," in Mendelssohn's "St. Paul," is worthy of the highest praise.

'Cello playing was of slow growth, as for a long time the old six-stringed viola da gamba kept the newer instrument out of orchestral and chamber music. But the more powerful tone of the 'cello was needed to support the brilliancy of the violins, and in the time of Corelli and Tartini we find it in definite use for accompaniments. Gradually it became a solo instrument, and gained prominence in the string quartet under Haydn and Boccherini. With the advent of the French player Duport came another advance, his introduction

of the chromatic fingering marking an epoch in the history of the 'cello. So well did this performer play, that Voltaire, enraptured by the expressive tones that he drew from the unwieldly instrument, said to him, "You make me believe in miracles; for you can make a nightingale out of an ox." In the last century the great virtuosi have taken pride in performing on the 'cello the most difficult violin pieces, such as Tartini's "Trille du Diable," for instance. The most wonderful master of the 'cello was by all odds Adrien François Servais, who died in 1866. Under his large and vigorous hand the 'cello vibrated with the utmost facility of expression; never, before his appearance, had it yielded such effects, and his compositions remain as illustrations of the most marvellous instrumental art, comparable only to those of Paganini for the violin.

The contrabass, or double-bass (violone in Italian), is the largest and deepest of all the stringed instruments. Its size, familiar to concert audiences, may be further illustrated by the old English custom of giving trios with one of these instruments, the performer adding a second part with his own voice, while a boy concealed in the

body of the instrument sang a treble part. The work of the contrabass in doubling the part of the 'cello, an octave deeper, has already been mentioned; but while the latter serves as a bass for the strings alone, the former fulfils that function for the entire orchestra.

CONTRABASS

There are two kinds of contrabasses, those with three strings, and those with four. The three-stringed ones are used chiefly in England, though other countries employ them also. The four-stringed basses are the instruments found in the orchestra. The tuning of the instrument varies according to the nationality of the player. The four-stringed bass is generally strung in fourths, giving the tones E, A, D, and G in ascending order. The lowest tone is nearly three octaves below middle C, thus sounding the lowest E on

the piano. The contrabass is the first example yet discussed of a transposing instrument, its notes being written an octave higher than they actually sound, to prevent the use of too many leger lines. It is of course notated in the bass clef. Its compass runs from its lowest tone to A below middle C — about two and a half octaves.

Berlioz, in his treatise on orchestration, advises conductors to have half their basses tuned to E, G, D, and A, thus placing more open tones at their command than if all the basses were tuned alike. Special tunings are sometimes adopted for single passages. In the beginning of the "Rheingold," for example, Wagner directs his basses to tune their lowest string to E-flat, to sustain a long bass tone in that key, while above it flow the waving chord-arpeggios that give such a marvellous picture of the measured motion in the depths of the Rhine. In "Tristan," in the second act, two double-basses are directed to tune as low as C-sharp for a short time. Beethoven, in the sixth (Pastoral) symphony, has written as low as C in one instance, a fact which led the German Karl Otho to invent a five-stringed instrument with C for its lowest tone. Many players

tune their fourth string down to D as a regular procedure. The three-stringed instrument is tuned to A, D, and G in England, but many Continental players tune it in fifths, an octave below the three upper strings of the 'cello. The tuning in fourths is preferable, however, for the fingering is much more practicable in this case. Owing to the size of the neck, the thumb cannot reach around to the strings as on the 'cello. The thickness of the strings demands great strength in stopping them.

The tone-colour of the contrabass is heavy, gruff, and ponderous. It may also be used with telling effect in solo passages to give ominous significance. It has also been skilfully used in burlesquing the quicker effects of lighter instruments. The technical points of execution are as a rule similar to those of the violin, although there are some important exceptions. Thus double-stopping, which becomes difficult on the 'cello, is almost impossible on the contrabass unless one of the strings gives an open tone. In orchestral work the effect is obtained by dividing the basses into parts, as for instance in Meyerbeer's "Dinorah," or the beginning of Tschaikowsky's Pathetic Symphony. The performance

of swift passages can never be entirely clear, as the long, thick strings are slow to cease vibrating. In Mendelssohn's 114th Psalm, for example, are many bars in which the contrabass plays sixteenth-notes at a metronome mark of 116 for the quarter-note. Such rapid work can never be wholly effective. Harmonics are of little value, although we find Verdi using them combined with those of the 'cello, in the passage from "Aïda" already mentioned. Artificial, or stopped, harmonics are wholly impracticable. Mutes are seldom employed on the double-bass, as they produce little or no difference in the quality of the tone. On the other hand, repeated notes and tremolo are remarkably good, the latter being especially portentous in effect.

Solo playing on the contrabass wins applause rather for the skill displayed than for the actual music drawn from the instrument. The effect is not unlike that produced by an elephant who has been trained to dance. The performance is often successful, and elicits the admiration of its audience, but after it is over there still remains a lingering suspicion that there was no necessity for such feats of agility. Many solo players have existed, however, especially in England,

where the three-stringed double-bass tuned in fourths made matters as easy as possible for the artists. The most famous performers upon the instrument were Dragonetti and Bottesini. Dragonetti possessed a remarkably fine contrabass, upon which he would create almost impossible effects. It was with this instrument that he scared the monks of San Giustina, at Padua, by imitating a thunder-storm with such fidelity that he brought them out of their cells in the dead of night.

Owing to its deep pitch and comparatively monotonous tone-colour, the contrabass is not often used as a solo instrument in the orchestra. Almost the only example of its employment in this manner is Mozart's bass song, "Per questa bella mano," in which the voice part is accompanied throughout by an obbligato for the instrument. This obbligato part is extremely curious. It is written altogether in the G clef, and not only rises to an extraordinary height, but contains much double-stopping, and even chords, which are declared wholly impossible by some of the most eminent double-bass players of the present. In one of the chords is a tone which, by its relation to the others, must indicate an

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open string, and from this it appears as if the part sounded lower than written by two octaves instead of one. There is no real clue to the solution of this problem to-day, but it is not unlikely that the entire part was written for a smaller instrument than the one now in use, with shorter strings and different fingering. Such reductions in size are not unknown, for Bottesini used to play his solos on a smaller instrument than that used in the orchestra.

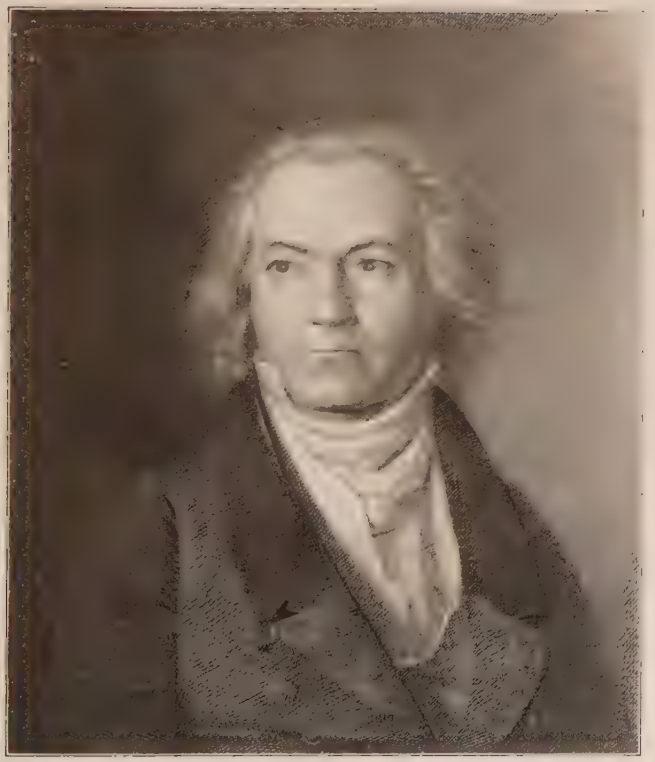
The pizzicato on the contrabass is of excellent quality, the long strings sustaining the tone for some time. A well-known example of this is found in the sombre A, for contrabasses pizzicato, which follows the melodious horn quartet in the "Freischütz" overture, and immediately changes the romantic effect to one of gloom. Rossini, in his overture to "William Tell," divides his instruments and obtains an effect of pizzicato and bowing combined. Another famous passage for basses pizzicato is found in the "Symphonie Fantastique" of Berlioz, where the hero, after killing his love in a fit of jealousy, is marched to the scaffold amid the sound of threatening four-part chords on those instruments.

The possibilities of the contrabass were recognised before the classical period, as may be seen from Bach's use of it in "Ye Lightnings! Ye Thunders!" In the opera of "Orpheus," Gluck employs it with telling effect in a glissando passage that gives an excellent imitation of the barking of Cerberus. But the first composer to bring it into prominence was Beethoven. In his fourth symphony, at the very end of the last movement, is a rapid passage for the instrument that demands all the performer's skill. Orchestral players save themselves all through this symphony in order to put forth their best efforts in the finale, for this symphony, like a wasp, bears its sting in its tail.

When the composition first came out, the mercurial Weber, who was often at odds with the more serious and irascible Beethoven, wrote a graphic satire on this passage, in a musical periodical of the time. He placed the scene in a concert-hall, just after the close of a Beethoven programme including the fourth symphony. After the departure of the musicians, the instruments themselves came to life, and began to hold an indignation meeting in protest against the ruthless composer who forced them so merci-

lessly to do all sorts of new tricks. After the piccolo, the flute, and others had aired their grievances, the contrabass arose gravely to remark: "Your troubles are of little moment, and can easily be borne; but what do you think of mine? Instead of allowing me to proceed in a staid and orderly manner, as befits my dignity, this intolerable young composer makes me run and skip, and jump about in the craziest manner, just as if I were a giddy young violin." At this the instruments burst out in wild cries of anger, causing such an uproar that the janitor heard the noise and came back into the hall. On realising the situation, he commanded the instruments to stop their turmoil instantly, or he would get Mr. Beethoven to write another symphony. At this the tumult ceased, for the assembled instruments at once grew mute with terror.

Beethoven's usual reply to adverse criticism consisted of about equal parts of personal abuse and profanity. But he was always true to his ideas of art, and whenever he was attacked for what he deemed right, his usual reply was to "do it again, and do it harder." We find him adopting the same plan in this case, and rapid contrabass passages, so scathingly criticised in



LUDWIG VAN BEETHOVEN

the fourth symphony, occur again in the trio of the scherzo of the fifth. In the Pastoral Symphony, to produce the effect of the rumbling of thunder in a storm, Beethoven adopted the ingenious plan of uniting the contrabass with the 'cello, and having the former play groups of four notes while the latter played groups of five in the same time. Thunder-storms seem to be a most popular subject with the great composers, and we find examples of orchestral tempests in the works of Haydn, Berlioz, St. Saëns, Verdi, and many others besides Beethoven. In the eighth symphony, Beethoven produced another effect from the instrument, this time one of inimitable humour. That entire symphony is overflowing with examples of the most delightful gaiety, and not the least among them is the passage in the last movement, where a graceful, tripping little theme of a few notes is tossed about from flute to violin, and finally given a brusque imitation with all the ponderous force of the contrabass.

Most wonderfully impressive, however, is the use of this instrument in the great ninth symphony. Beethoven was by nature a lover of liberty, a dreamer of universal human brother-

hood, and this tendency shows itself in such works as his "Egmont" overture, or the Eroica Symphony. In the ninth symphony Beethoven aimed at nothing less than a musical picture of the contrast between the strife and tumult of the world, and the happiness of the millennium. For his text he took the words of Schiller's "Ode to Joy," introducing voices to sing it in the closing movement of the work. It is in this final movement of the piece that the marvellous passages for contrabass are to be found.

The earlier movements have had their share of beauty and tenderness, but in the opening of the finale, turbulence and discord seem to obtain full sway. The music appears to utter a cry of agony, as if to show that all human effort is of no avail in soothing the turmoil of the world, and leads only to greater confusion. Then follows a musical dialogue between the entire orchestra, on the one hand, and the contrabasses on the other. Three of the phrases of the earlier movements return, as if offering a remedy for the evils depicted. They are interrupted in turn by a phrase of solemn dignity on the contrabasses in unison. Their tones seem as impressive as if they were the voice of a

Redeemer rebuking the passions of a suffering world. After the three recurring themes have been reviewed, two to be hushed into silence by the measured unison response, while the third, the gentlest, shrinks abashed into silence, the song of joy is to enter, showing that universal brotherhood, and not strife and warfare, is to be the true key to happiness. But before the voices begin, there must be some preparation for them, some gradual introduction of them into the orchestral forces. Again the contrabasses come into use, and their broad, full tones sound forth with telling effect the impressive melody that is to be taken up afterward by the voice part.

The rest of the movement consists of variations on the theme, for voice and orchestra. But Beethoven was essentially an instrumental composer, and wrote for the voice as if it were insensible of the fatigue consequent upon human efforts. As a result, a perfect performance of the choral part is somewhat rare, although the auditor is compelled to admire the magnificence of its conception. There is no such drawback to the contrabass work, however, and the passages for it remain an example of the noblest use of this instrument.

CHAPTER V.

THE HARP

Among those instruments whose strings are set in motion by plucking, the most important, as well as the most ancient, is the harp. Its origin from the bows of savages has already been described; and the nanga, a typical form of the negro harp, is shaped almost exactly like a bow, with five strings instead of one. The harp is found among nearly every ancient race that possessed any instruments, and almost always its frame consists of one large curved piece with the longest string running from end to end. An exception to this form is found upon the Assyrian bas-reliefs, where the harp is pictured with a slanting frame, slightly curved, from which the strings run vertically to a horizontal bar. The Egyptian harp possesses the curved form, and the Hebrew harp, or kinnor, was probably a copy of it, although Kalkbrenner ascribes the form of

a triangle to it. The number of strings was variously given as from ten to thirty-two, showing different sizes, and probably different shapes. The Greek word kithara is translated indifferently by the terms lyre, lute, or guitar, as well as harp.

The Irish claim to have originated the harp, and Galilei credits them with its invention, but the Assyrian instruments were certainly of earlier date. Be that as it may, it was probably the Irish harp that was brought back to Italy by the Roman legions returning from Britain, and its use in the Apulian city of Arpi possibly gave the instrument its name.[1] The nations of Northern Europe adopted it from Rome, and have practically one name for it, while the terms applied to it by ancient races are entirely dissimilar.

The Irish harp was strung in three rows, the two outer ones of twenty-nine strings each, giving the diatonic scale in unison, while the middle set of twenty gave the chromatic intervals. There were other forms of the instrument, and from one of these came the "arpa doppia," or double harp, found in Monteverde's "Orfeo." The

[1] Max Müller, however, gives a Teutonic origin for the term "harp."

triple form existed down to the end of the eighteenth century.

The harp was a favourite instrument with the ancient Britons. The old laws of Wales mention its use as one of the three things necessary to distinguish a freeman or gentleman from a slave. Pretenders were discovered by their unskilfulness in playing the instrument. The laws also forbade a slave to touch a harp, even from mere curiosity, and none but the king, his musicians, and the gentlemen of the realm were allowed to possess one. The harp was exempt from seizure for debt, for it was presumed that the man who had no harp had lost his position and was degraded to the rank of a slave.

The Eistedfodds, or periodical gatherings of musicians in Wales, are no longer anything more than festival concerts or competitions. But in the ancient days they were of national importance. Only those bards who had reached the rank of chief minstrel were permitted to teach, and one of them presided at the assembly. Candidates were presented by a chief minstrel, who had to vouch for them, and they were required to pass a novitiate of three years for entrance, and several other periods of three years

for the higher degrees. Such a gathering is mentioned as early as the seventh century. The harp was familiar to the Anglo-Saxons, and the early chronicles show that the minstrel was always respected for his skill, whether he was known or unknown. With harp in hand he might wander freely, even in the camp of an enemy. As early as 495, Colgrin, besieged in York, received assistance from his brother, who went through the hostile camp disguised as a harper. The story of King Alfred's adoption of the same artifice, in his struggles with the Danes four hundred years later, is well known, although its authenticity may be doubted.

Bede states that it was the custom at festive occasions to hand the harp around for each guest to sing and play in turn. Once the poet Cædmon, who had neglected music in pursuit of more serious studies, found himself in such a gathering, but being unable to play in his turn, felt too humiliated to remain, and arose from the table in shame and returned to his house.

The German Minnesingers made constant use of the harp, employing it to accompany their songs in place of the guitar favoured by the troubadours. An illustration of the effect pro-

duced is to be found in "Tannhäuser," where Wagner makes the knight Wolfram sing with harp accompaniment a solo of homage to the saintly Elisabeth, and uses the instrument to accompany all the contestants in their competition on the Wartburg.

In Great Britain the introduction of the guitar, and other light instruments, such as the lute and viol, diminished the popularity of the harp, while the virginals and harpsichord drove it still further into obscurity. It existed, however, in the rural districts, and kept its ancient form. When Handel produced his oratorio "Esther," in 1720, he inserted harp parts for one of the choruses, which were performed by two Welsh players.

In the old diatonic harps, the performer could modulate only by using his thumb to stop the strings and alter their pitch. The invention of pedals to perform this function has been attributed to Hochbrucker, in 1720, and to Paul Velter, in 1730. These early pedals were crude and awkward, but they paved the way for later improvements.

The historian Burney, in his travels (1773), mentions the harp as much played on by ladies,

and describes it as follows: "It is a sweet and becoming instrument, and, by means of the pedals for the half notes, is less cumbrous and unwieldy than our double Welsh harp. The compass is from double B-flat to F in altissimo; it is capable of great expression, and of executing whatever can be played upon the harpsichord; there are but thirty-three strings upon it, which, except the last, are the mere natural notes of the diatonic scale; the rest are made by the feet." The pedals mentioned here, Burney explains, were those invented by M. Simon, of Brussels, about 1758. They were useful in more ways than one; for by reducing the number of strings they improved the remaining tones, as the sounding-board could vibrate more freely in consequence of its having less weight to carry. The harp in this form was much used by the composer Gluck, especially to play the part of the lyre in the hands of his operatic hero Orpheus. Mozart, too, employed the instrument, writing among other works a concerto for flute and harp.

But the modern concert harp is due to the work of Sebastian Erard (or Erhardt), who perfected it in the year 1810. His earliest efforts date back to 1786, and were devoted to improv-

ing the single-action pedal. In 1801 he produced a double-action harp, but it was not until nine years later that he perfected his contrivance and created the model that all harp-makers have followed since his day. The frame of the modern harp consists of the gracefully curved neck, from which the strings descend to the slanting sound-board, while the vertical pillar forms the third side of the triangle. Erard's mechanism consists of pedals, placed in a semicircle about the foot of the pillar. These communicate their motion to rods in the pillar, which in turn move levers in the neck. Connected with these levers are two sets of discs, and from each disc project two pins which allow the string to pass between them. Two discs, one from each set, are thus ready to clasp each string. A half-way motion of the pedals causes the discs to rotate slightly, the first disc of the two gripping the string with its pins, and raising the pitch a semitone. A further

ERARD HARP

movement of the pedals causes the second disc to act, raising the pitch another semitone. Notches are provided, so that the pedals may be set to stay in either position; when not in these notches, the pedals are forced back by springs.

There are seven pedals to alter the pitch on the harp; an eighth one acts merely like the damper pedal of the piano, but is so unimportant that it is often omitted.[1] The strings give the seven tones of the diatonic scale, but are tuned altogether in flats, giving the key of C-flat. Each pedal acts only on one note of the scale, one pedal for example influencing all the C-strings. When all the pedals are set half-way, the harp is in the key of C-natural. With all the pedals in the second notch, the instrument gives the scale of C-sharp. There are forty-six strings on the harp, giving it a compass from the lowest C-flat to the highest F of the piano, — six and a half octaves. To aid the performer, all the C-strings are coloured red, and all the F-strings blue. As the action of the pedals fixes the key, there is no other change needed, and the different scale-fingering of the piano keys does not find a par-

[1] It operates by shutting a set of open gates in the sound-box, thus confining the air and preventing its free vibration.

allel on the harp. The performer sits with the pillar of the instrument away from him, and extends his arms on both sides of the strings. As he has two hands, his music must be written on two staffs, the G and F clefs being used precisely as with the piano. Long passages for the lower strings are impracticable, for two reasons, — first, these strings are too thick to sound well, and second, the performer will soon be wearied by the long stretch for his arms. It is also best to write for the harp in flat keys if possible, as the open strings give better tones than the stopped ones. Thus Prout, in his cantata "Alfred," does not write the harp part in F-sharp, the key of the piece, but in G-flat, which is the same thing in our tempered scale. This change implies only a half-way movement of the F-pedal, while in the sharp key all seven pedals would have to be moved, and all full distance except the F. In his work on instrumentation, M. Gevaert draws attention to a long harp passage in "Faust," in the key of B major, which would have sounded much better and been more practical in the key of C-flat, for the same reason. Another point to be avoided by composers is the quick use of excessive modulation, for the performer needs time

to produce the necessary changes in the position of his pedals. Prout, in his book on the orchestra, quotes a long passage from the final scene of "Die Walküre" as an example of how not to write for the harp. It is a descending sequence of sixteenth notes, with a semitone between each group. Of wonderful beauty in aiding to picture the onward creeping of Loke's magic fire, it is almost impossible to perform, and one of the best London harpists had to practise it an hour a day for some weeks before he was able to play it in the Richter concerts.

With the exception of chromatic passages, nearly everything suitable for piano will sound well on the harp also. As the little finger is never used, chords for one hand should not contain more than four notes. Chord-effects are among the very best that the instrument produces. The name arpeggio itself, applied to sweeping chords on any instrument, shows clearly its derivation from the harp. The arpeggio refers to a quick run, and not to a chord with all its notes struck at the same time. By alternating his hands, the performer can run rapidly to and fro over the whole compass of the instrument. In writing, the arpeggio should be properly divided

between the hands, and if the composer is not himself a player, he had better leave this to the discretion of the artist.

Very beautiful results are obtained by the use of harmonics of the harp. They are not practicable throughout its entire compass, for the highest strings are not resonant enough, and the lowest are too thick. But on all the others the quality of the harmonics is excellent, giving a peculiarly clear tone that compares well with those from the bowed instruments. The only harmonic used is the first of the series, giving an octave above the open tone. It is produced by touching the string very lightly, exactly in the middle, with the ball of the palm, and plucking the string with the thumb or the first finger. For all open tones, the strings are plucked a little above the centre.

An abrupt staccato, called étouffé, is produced with the hand in a position similar to that used for harmonics. Instead of placing the palm on the string at once, however, the performer first plucks it, and then stops the tone by pressing hard instead of lightly with his hand. The usual method of stopping all tones, after they have sounded long enough, is laying the extended

hand upon them. The poet Longfellow, in his "Golden Legend," has made a beautiful simile by alluding to this point in the lines:

> "Time hath laid his hand upon my heart
> Gently, not smiting it,
> But as the harper lays his open palm
> Upon the strings, to deaden their vibrations."

If the harp strings are plucked near the ends instead of just above the middle, more overtones are formed. The thin, penetrating tones thus obtained have a quality somewhat resembling that of a guitar.

Trills upon the harp are perfectly possible, but they are not strong enough for any especial value to be attached to them, and are usually given to other instruments. The much-used glissando of the harp is not, like that of the violin, a continuous change of tone, but is a quick scale produced by a rapid motion of the performer's hand across the strings.

A tremolo, or repetition of a single note, may be easily produced by tuning two adjacent strings together. As may be seen, from the description of the pedals, it is not possible to obtain the notes D, G, or A with more than one string;

but every other tone of the chromatic scale may be reached by two strings. Thus for instance C-sharp, obtainable from the C-string, is the same as D-flat on the D-string. Two strings thus toned together give what are called synonyms, or homophones. By using each of the single tones D, G, or A in turn, and tuning the others in pairs at intervals of a minor third apart, it is possible for the player to produce, upon any degree of the scale, a succession of minor thirds forming the chord of the diminished seventh. A glissando upon the harp will then give that chord instead of the diatonic scale. Other chords may be formed, giving a variety of glissandos.

The harp gives the fullest and richest tone of all plucked instruments, and is eminently suited for accompanying the voice. As it was the best instrument known to the ancients, they assigned it a place in their heaven, and it has come down to our day as a typical instrument for celestial effects. The orchestra of the present, however, is capable of producing more beautiful music, and Wagner, the great apostle of common sense in opera, adopted other means to depict heavenly ecstasy. In picturing the descent of the Holy Grail from heaven to earth, in the prelude to

"Lohengrin," he discards the harp, and uses four solo violins, in harmonics, combined with three flutes. That Wagner could produce marvellous effects from the harp itself, when he wished, we have already seen, and shall see again.

The harp did not appear in the earlier orchestras. Bach did not use it, and Handel, after some experiments, dropped it altogether. It was not included in the classical orchestra of Haydn, and we find Beethoven employing it only once, in the "Prometheus" overture, composed in 1801. Weber did not seem to care for it in the least, and it is not found in any of his operas. But one German composer of his time wrote copiously for the instrument, — Ludwig Spohr. Perhaps his employment of it was a matter of domestic harmony, as much as of actual preference; for he married Dorette Scheidler, an excellent harpist, and wrote for her a number of sonatas for violin and harp. The composer himself filled the part of violinist, while his wife played the harp, in their numerous tours. Schumann, also, has made effective use of the instrument in his cantata "Faust."

If the Germans were not especially fond of the harp, the reverse is true of the French.

Gounod has employed it frequently. Berlioz, in his "Childe Harold" symphony, has produced an ingenious bell effect by the combination of harp and horn, the harp giving the twang while the horn adds resonance. For a higher bell, in the same work, he has used the harp with flute and clarinet, while in his "Faust" he gives free rein to his passion for wholesale effects, and demands ten harps. Meyerbeer, in "Le Prophète," supports the voice in one passage by two harps in separate parts, obtaining richer effects than those of Brahms, for instance, who doubled the harps in unison in his requiem. St. Saëns, in his "Danse Macabre," opens the riotous proceedings of the skeletons with the twelve strokes of midnight, sounded upon the harp. Crossing the English Channel, we find Cowen using the instrument to add local colour to his Welsh Symphony.

Wagner's use of the harp in the Magic Fire music has already been mentioned; even more difficult, and if possible more beautiful, is the harp passage at the end of the "Rheingold." The gods have bought their new abode of Walhalla, and paid for it with the golden hoard stolen from the Rhinedaughters. As they march upon

the rainbow bridge which spans the abyss and leads them to their new home, six harps sound forth chords of the most varied and intricate description, interlacing in a way to produce a shimmering mass of tone that is absolutely iridescent in its effect.

The harp to-day is almost exactly the same as Erard's model. Berlioz mentions an alteration that was proposed by Parish Alvars, by which the C, F, and G strings were to be given triple-action pedals. This would enable them to double the notes D, G, and A, producing the three missing synonyms on the instrument. But the suggestion has not been carried out. More recent is the invention of a chromatic harp, made by Pleyel, Wolff and Company, of Paris. This harp, brought out in 1898, has not yet had time to become widely known, although its strings must give good tones, since they are always open. There are seventy-eight strings, giving the same compass as the Erard harp. They are arranged in two sets, diatonic and chromatic, which cross each other in the middle, instead of being vertical as in the old *arpa doppia*. Some technical points of execution are impossible on this instrument, such as chord-glissandos, for instance.

The harp is the only instrument with plucked strings that forms part of the orchestra; but others exist, and are sometimes called for in large works. The most important of these is the guitar, which has six strings, three of catgut, and three lower ones of silk wound with fine wire. The guitar is tuned in fourths and thirds, giving the notes E, A, D, G, B, and E in ascending order, starting with the E below middle C. But it is really a transposing instrument, sounding an octave deeper than written. For sharp keys it may be tuned E, B, E, G-sharp, B, and E. Its compass is given as three octaves and a minor third. The guitar is fingered with the left hand, the neck being provided with

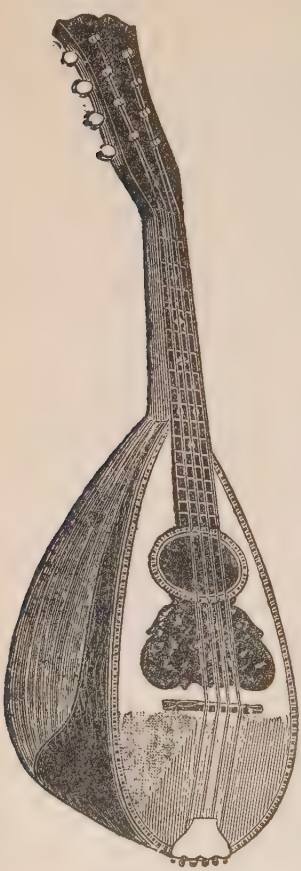
GUITAR

frets to mark the proper places, while the strings are plucked by the right hand, — the three lowest by the thumb, the others by three fingers in order, while the little finger rests on the face of the instrument.

The guitar, which can give most excellent effects when handled properly, came near wrecking the success of Erard's harp in its early days. The harp was being taken up by the upper classes in London, when suddenly a band of Spanish students appeared at that capital, and gave guitar concerts that charmed all hearers. The result was that all London seemed ready to forsake the harp and adopt the guitar. Foreseeing this disaster, it is said, Erard determined to take immediate steps to avert it. He bought at once several hundred guitars, and as many copies of a printed method for playing them, and distributed them among shop-girls, waiters, and others of humble station in life. The result was that the richer and more exclusive classes, seeing the new instrument in such vulgar hands, speedily dropped it and returned to their former favourite, the harp.

The guitar is eminently fit for accompanying the voice, and Rossini has used it for this end

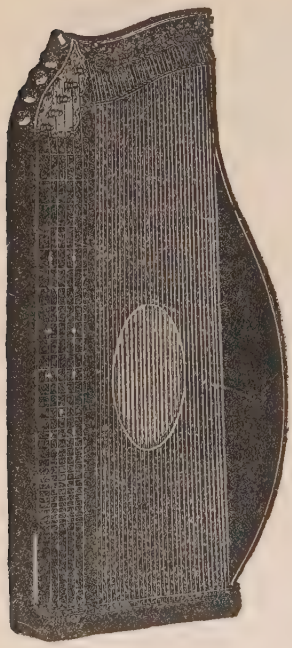
in Almaviva's air in the "Barber of Seville." It lends itself well to arpeggio effects, and gives many pleasing harmonics. A good tremolo may be produced by alternating different fingers on the same string. Composers employ it little, and when they do use it they seldom bring out its best possibilities. Since the introduction of the pianoforte into musical homes, the use of the guitar has become unimportant except in Spain and Italy. Its feeble resonance bars it out of the orchestra, and its nature makes it essentially a solo instrument. But its dreamy and melancholy character is of excellent effect, and it has a real charm of its own.



MANDOLIN

The mandolin, although thin and nasal in tone-quality, has something appealing and original about it, which might occasionally be effectively used. There are several kinds of mandolins, of which the best possess eight strings, tuned in pairs to the tones of the violin strings. The lowest two are catgut covered with silver wire, the next two copper, the third pair steel, and the highest strings catgut. They are not plucked, but are played with a pick or plectrum. The instrument can give chords, but is more effective in melodic passages. One of the most noted examples of its use is found in Mozart's "Don Giovanni," where the amorous hero employs it to accompany his serenade. This selection is now usually given to the violin, played pizzicato. This is the passage that figures in an anecdote of the great violinist Joachim. He was to play it on a certain occasion in Leipsic, but just before his appearance some one (a conservatory pupil, it is thought) managed to get at the artist's instrument and place some split peas in the sounding-box. Instead of the dainty pizzicato runs, the soloist produced a series of sudden rattlings, effective in their way, but wholly unexpected. This incident gave a good illustra-

tion of the fact that the full violin tone is caused by the vibrations of the box rather than those of the strings; but the story makes it seem rather doubtful whether the artist cared much for acoustical principles at the time. He never discovered the perpetrator of the joke.



CONCERT ZITHER

A successor of the now obsolete lute is the zither, which consists of a rectangular sounding-board provided with thirty strings, which run horizontally over it. The lower strings are played by a pick on a ring that fits the performer's thumb, while the upper ones are plucked. The instrument is much used in Switzerland.

CHAPTER VI.

THE FLUTE AND PICCOLO

THE great antiquity of the flute has already been mentioned. But besides being one of the most ancient, it was one of the most wide-spread and popular instruments of antiquity. The term flute, however, has been used to cover a multitude of sins against precision in the naming of instruments, and in the old days included pipes with vibrating reed tongues, like our clarinets or oboes, as well as true flutes, which give tones merely from the vibration of the column of air in the tube.

The distinction between flute-à-bec and traverse flute has always been clearly marked, the former being blown into directly by the mouth, while the latter is held sidewise and blown into through a hole. Ancient Egyptian and Assyrian instruments of the flute-à-bec type (called beak flute afterward in England, from its fancied resemblance to a bird's beak), existed in both

single and double forms, according to old pictures. The double forms consisted of two tubes united into one at the mouthpiece, each fingered by one hand. They were capable of producing two melodies, but it is possible that one tube, being often longer than the other, gave a sort of drone bass. The Greek flute, or aulos, may have had its tubes tuned in two different modes.

The use of instruments in the Grecian games has already been alluded to. The flute had its share of prominence in the *pentathlon* of the Olympic games, when it served to animate the contestants in the five athletic sports of leaping, running, throwing the spear, throwing the discus, and wrestling. Naturally it must have been played in a violent manner for this purpose, and it is recorded that Harmonides, a young flute-player, wishing to astonish the audience on his first appearance, blew such a tremendous blast that he expired on the spot. It is probable that he burst a blood-vessel; but it is certain that he succeeded in astonishing his hearers. In the Pythian games the flute was put to a more legitimate use; and prizes were given for the best solos upon it. But this custom was afterward discontinued, for the Amphictyons used the

instrument in dirges and funeral music, and its associations became too melancholy to permit its use in the games.

Flute-playing became part of the education of the Grecian youth. Players of ability were held in high honour, and the art received such an impetus that different flute schools were established in Athens, and rival methods of playing and teaching existed. Flutes were used in almost every place where music was required. One composer even went so far as to write for flute, with kithara accompaniment, a tone picture of the combat of Apollo and Python, — probably the earliest piece of "programme music" on record. Great flute-players became immensely popular, and the story of their rivalries and the cliques that supported them reads not unlike a page from the history of our own opera singers. The instrument itself was much prized, and some flutes were sold for as much as three thousand dollars apiece.

This popularity received a slight check, however, about 400 B. C. At that time the young and popular Alcibiades declined absolutely to play the instrument, alleging as his reason that the large mouthpiece would spoil the shape of his mouth. As he stood at the head of the fash-

ionable as well as the political world, his decision had wide-spread effect, and all the influential classes laid aside the flute. But some ingenious maker overcame the difficulty by constructing a flute with a smaller mouthpiece, which Alcibiades found more to his taste, whereupon the instrument resumed its place in popular favour.

In Sparta the flute led the chorus, and was the military instrument, but the inhabitants disdained to study music as an art, and were content merely to discriminate between good and bad playing. In some Ionian cities, the human victims were led to the sacrifice or to their execution accompanied by the sound of flutes. This dead march, called the "Nome of Kradias," was said to be especially gloomy in effect. In this connection it is worthy of note that Handel has employed flutes prominently in the "Dead March" from "Saul."

One of the most famous of Athenian flutists, renowned through Greece and Egypt for her wit and beauty as well as for her skill, was Lamia. Although born in Athens, she went while young to Alexandria to study her art, very much as our modern musicians go to Italy or Germany. She was well received at the Egyptian court, and was

detained there for a long time. Captured by Demetrius Polyorcetes, she soon succeeded in making him captive to her charms. On her return to Athens a temple was built to her, and she was worshipped under the name of Venus Lamia. The influence of her powerful adorer Demetrius may have had something to do with this deification, but her personal attractions are amply confirmed by a portrait of her which has been found in a signet.

The salaries paid to flute-players were usually very large. One performer, Nichomachus, acquired an immense fortune, which he placed wholly in jewels. In the theatre, too, flute-players were well paid, receiving from the director or choregus more than the singers of the chorus. That this was a large sum may be seen from a saying, current among the Athenians, that the way to ruin a man was to get him appointed choregus.

In Egypt, there is a record of a great musical festival given by Ptolemy Philadelphus, at Alexandria, in the year 280 B. C. On this occasion six hundred skilled singers, kitharists, and flutists took part. There were larger festivals than this in ancient times, but none that included the

skilled talent that was present at this one. Ptolemy Physcon, a century or more later, seems to have patronised and enjoyed flute music. This amiable ruler married his brother's wife, killed his baby nephew (or stepson) on the wedding-day, afterward married his niece (or stepdaughter), and finally killed all the progeny. But he still posed as a lover of art, and doubtless enjoyed music, in spite of his domestic troubles. Ptolemy Auletes, father of the renowned Cleopatra, received his surname of "flute-lover" from his fondness for that instrument. Although much occupied by his duties as ruler, he still found time to become a very skilful virtuoso on it.

In Rome, the earliest temples were raised to Ceres and Mars, and in both edifices the flute played a prominent part in the services. Flute-playing formed a part of the worship of Mars even in earlier times, among the Etrurians. The flute gradually came into secular use also, and became the national instrument of the Romans. It was called tibia, from its origin, tibia being the name of the shin-bone from which the earliest flutes were made. In later times the instrument assumed larger proportions, was ornamented with heavy brass binding-hoops, and had an immense

resonance. It was used by both sexes, but in public, and especially in the religious services, was played by men alone. It was prominent in the triumphal processions, being employed at the

FLUTE-PLAYING AT A ROMAN SACRIFICE

sacrifices that usually graced those festive occasions.

The great demand for flute-music made the art of playing the instrument a most remunerative one. The flute-players soon became numerous and powerful, and formed themselves into a guild, or protective society. This guild flour-

ished for several centuries, and enjoyed many privileges. Valerius Maximus has given an anecdote which shows how powerful and exacting the guild could afford to be.

One day, for some reason, they were excluded from the Temple of Jupiter, where they had been allowed, by ancient custom, to take their meals. Upon this the entire guild left Rome, and went to the neighbouring village of Tiber. This caused great embarrassment in the city, for without the musicians no religious service could be held, and no state ceremony properly conducted. The senate at once sent an embassy to induce the deserters to return; but it was of no avail, for the angry musicians remained obdurate. The messengers then persuaded the villagers to give them aid in secret. The inhabitants arranged to give a great feast of welcome to the flute-players, but took good care that the guests should be well supplied with wine. When they were wholly overcome with the liquid refreshments, they were bundled into chariots, and driven back to Rome. In return for the trick played upon them, they received many new privileges, as well as all their old ones. They were allowed to give public performances, but at

these they were always masked, the reason given being their shame at their inglorious return to the city.

Flutes were used at funerals, but the luxury and display on these occasions became so great that a law was passed limiting the number of flute-players to ten. Flutes were employed in combination with other instruments, and Apuleius mentions a concert of flutes, kitharas and voices, the whole giving a remarkably sweet effect. The instrument had still another use, that of a pitch-pipe, and great orators would usually have a slave stand behind them with a flute, to give them the proper pitch when their voices sank too low or became too shrill. Caius Gracchus always employed this aid in his speeches.

In the time of the Empire, many new instruments came into use, but the flute retained its importance. Many emperors were fond of it, though it seems strange that the most wicked of them should be the chief patrons of music. Heliogabalus was fond of dancing and singing, and quite proficient in giving musical recitations with flute accompaniment. Titus was a good singer and player. Domitian and Vespasian both established games in which there were

musical contests for prizes. Caligula and Nero were both fond of the instrument, though both devoted themselves to singing rather than playing. The former was so fond of music that he could never help humming along with the melodies in the theatre, and he seemed ready to let music take precedence of all else. It is said that during the height of his tyrannical power he sent one night for three men, of consular rank, to attend him at once in his palace. In fear and trembling they obeyed, expecting nothing short of death. But, on their arrival, the sound of flutes greeted them, and the emperor himself suddenly appeared before them, and sang them a song before dismissing them. We can imagine that the applause, if perhaps not sincere, was certainly hearty.

In mediæval times, the flute no longer occupied the most important place, giving way to the guitar and fiddle of the troubadours. Flutes and pipes continued in use, however, in various forms, both straight and traverse. The old English beak flute, known as the recorders, has been mentioned as figuring in "Hamlet." It was an old and very popular form of straight flute, with a large hole in the side, above the

finger-holes, covered with thin bladder to affect the tone quality. It is mentioned in the time of Henry VII., and described as being best in the middle register, "but manifold fingering and stops bringeth high notes from its clear tones." Henry VIII., another of the race of musical tyrants, left in his collection of instruments a large set of recorders.

In more modern times we find still another royal devotee of the flute, this time Frederick the Great of Prussia. In 1728, while crown prince, he heard the great flutist Quantz at Berlin, and was so charmed by the instrument that he at once arranged to have the performer visit him twice a year and teach him to play. His father Frederick I., however, was a strict martinet, who cared little for artistic accomplishments, and under his stern rule the teacher and the pupil met only under difficulties. The old king, in fact, once threatened that if he found the prince taking any more lessons, he would break the latter's flute over his princely head and hang the teacher. He would undoubtedly have done this, too, for at another time he condemned his son to death as a deserter when the latter tried to run away from the disagreeable surroundings in his

father's palace. The king spared him only after the intercession of the English ambassador. It was with no little fear, therefore, that the prince and his teacher once beheld their royal father and master approaching during a lesson hour. All that saved the guilty pair was a friendly chimney, up which Quantz managed to crawl. The devotion of the musician had its reward when the prince became king, and after the death of Frederick I. Quantz became court composer. It was at this same court that Carl Philip Emanuel Bach, the most gifted of the sons of the great John Sebastian Bach, remained in comparative obscurity as accompanist for the king's flute-playing. The historian Burney has left a description of one of the royal musicales, and in it he gives high praise to the taste and skill of the kingly performer.

The instrument most commonly used in Germany at this period was the side-flute, which indeed was commonly known by the name of German flute. The old flute-à-bec was still played, but it gradually fell into disuse, and in the time of Bach and Handel it no longer formed a part of the orchestral forces. The German, or traverse flute, which remained in use, is still employed to-

day, though it has gradually given way before the improved flute of Boehm. The older form of the concert flute was a long wooden tube, tapering slightly in bore, with a large hole near one end serving as the mouthpiece, and smaller holes at the other end to vary the tones. The acoustical laws of vibration, so thoroughly defined in the case of the stringed instruments, are not so clearly known for the wood-wind group; but many points remain the same in both. Thus the lowest open tone of the flute, D above middle C, can be made to subdivide into harmonics by increasing the force of blowing. A still further increase in the air pressure brings out the higher harmonics. There are six holes for the fingers, all covered when D is sounded, and giving the diatonic scale of D major when released in succession. An increase in the force of the breath makes the first harmonic subdivision, raising the pitch an octave, and the finger-holes then produce the scale of this second octave. By similar procedure, part of a third octave may be obtained. The keys, when pressed, open other holes and give sharps and flats, and two extra keys give D-flat and C below the lowest D, so the compass of the instrument starts at middle C and extends upward for

nearly three octaves. The highest B and C, however, are rather too harsh in quality to be used often, besides being difficult to produce.

When the holes of the flute are placed at their proper position, it is often hard, if not impossible,

1. OLD KEYED FLUTE
2. BOEHM FLUTE, WOOD
3. BOEHM FLUTE, SILVER
4, 5. OLD STRAIGHT FLUTES
6. PICCOLO

for the player to stretch his fingers to reach them. It was to obviate this difficulty that Theobald Boehm, in 1832, brought out the form of flute that has now come into general usage. This form, to begin with, had a cylindrical instead of tapering bore, thus giving fewer

overtones with the fundamental note, and hence a mellower quality of tone. But the most valuable point was the adoption of a system of rings and levers, in combination with the keys, by means of which the fingering was brought into a much smaller space than was necessary before. The new system also obviated all difficulty in playing chromatic passages, and composers could write freely for the instrument, while the older flute, giving the scale of D, was of course easiest to play in that key, and became more difficult in keys distantly related to D.[1] On the older flute, owing to the fingering, trills were impossible upon many notes, while upon the Boehm flute the number of possible trills is far more exten-

[1] When Boehm had first perfected his flute, he went in person to London and Paris in order to introduce it. At the latter place he visited Rossini, then one of the most famous of living composers. While in the anteroom, waiting for Rossini to finish shaving, Boehm commenced playing all sorts of scales, arpeggios and roulades in every conceivable key, hoping thereby to create a favourable impression. At last he reached the key of D-flat, in which it would have been wholly impossible to play so brilliantly upon the old flute. Rossini could repress his interest no longer, but rushed into the room, heedless of the lather on his face, and cried:

"You can't play that!"

"But I am playing it," expostulated the inventor.

"I don't care if you are," replied the excited composer, "it is utterly impossible."

Rossini was soon convinced of his error, and became an ardent supporter of the new system.

sive. There are still a few, however, which are troublesome to the player.

The present theory of tone-production on the flute (advocated by Cavaille-Coll, Schneebeli, and Hermann Smith, and explained in Zahm's "Sound and Music") treats of the vibrations as formed by the sheet or blade of air entering the mouthpiece. This sheet is said to have a definite shape, and to vibrate exactly as a material reed. It will therefore produce a fixed tone, while according to the older idea the air produced a multitude of mixed sounds, out of which the tube selected and reinforced those that fitted its length. In reed instruments, unless the reed is very large and the tube very small, the tube forces the reed to take a certain rate of vibrations. The vibration of the column of air thus differs from that of strings, for in the latter case it was the strings that gave their tone to the sounding-box, while in tubes it is the resonance-chamber that enforces its vibration-rate upon the reed.

It is a fact that in all open tubes, when the fundamental tone is sounded, the column of air forms a node, or point where the air is not in motion, at the middle of the tube. The ends of the column, on the contrary, are in motion,

and correspond to the centre of the so-called ventral segment, or point of greatest amplitude of vibration. It is also true that at these points, where the air vibrates freely, its pressure remains unchanged, while at the node, where the air is held motionless in spite of the repeated vibration-shocks, the pressure varies. Any opening, therefore, such as the small holes in the side of the flute, tends to release the varying pressure by allowing communication with the outer air, thus serving to aid freedom of vibration and destroy nodes. As the performer opens the successive holes, starting from the outer end of the flute, he practically shortens the vibrating air-column, thus giving a higher pitch in his scale.[1]

Staccato notes on the flute are made by interrupting the breath with the tongue, as if preparing to pronounce the letter *t*. More varied effects can be obtained, however, by alternating other and less explosive consonants with the *t*, such as *k*, for instance. Thus a player may produce alternate sharp and dull interruptions, corresponding to the general character of the words "tucker" or "ticker." This procedure is called double-tonguing. By introducing still

[1] For an explanation of the acoustics of tubes, see appendix.

another consonant, the performer may produce groups of three notes, called triple-tonguing. Skilful players often employ this effect considerably.

The tone-colour of the flute varies according to its pitch. It gives dull, hollow tones in its lowest octave, sweet and full notes in its middle register, and shrill, piercing effects in the highest part of its compass. In general, the flute tones express a melancholy sweetness that cannot be duplicated upon any other of our orchestral instruments. Gluck, the pioneer in employing effects of tone-colour to depict emotion in opera, has used their subdued expression with exquisite effect in depicting the passionless joy of the shades in the Elysian Fields scene of "Orfeo."

The flute is in constant service in the orchestra, and one of its usual functions is to double the first violins in playing the melody. It also serves as the soprano instrument of the wood-wind group, the other parts of the quartet being taken by the oboe, the English horn, and the bassoon. But the flute possesses far more agility than the other wind-instruments, and this fact makes it peculiarly fitted for brilliant solos.

Excellent examples of such passages are the

well-known phrases for flute in Rossini's overture to "William Tell." A striking use of flute obbligato with voice is found in Handel's aria (from "Il Penseroso") "Sweet bird, that shun'st the noise of folly," where both voice and instrument give alternate imitations of a feathered songster who indulges in all sorts of trills, runs, skips, and other fiorituri. Beethoven, too, has employed the flute to represent orchestral ornithology, and in the slow movement of his Pastoral Symphony we find it used to represent the call of the nightingale.

Mozart, strange to say, was not fond of the flute. His early dislike for the trumpet arose from the fact that its strident tone grated too harshly upon his delicate ear, but there is no such simple explanation of his aversion to the softer instrument. Although we find him using flutes, he does not employ them copiously, even in the "Magic Flute." The concerto that he wrote for harp and flute, already mentioned, does not indicate any change in his opinions, but is an instance of his laying aside personal preferences for the sake of cash. Mozart was not the first to have this prejudice, for the great Scarlatti showed it also. When Quantz, the flutist,

begged for a solo passage in a certain composition, he was met with a firm refusal. The composer afterward said privately to Hasse, "You know I detest wind-instruments, for they are never in tune."

Such likes and dislikes of certain instruments are not uncommon among the great composers. Chopin, for example, was decidedly averse to the piano in his early youth, although he seems to have gone to the other extreme in maturity. A favourite instrument of Beethoven was the bassoon. Weber showed great fondness for horns and clarinets, and displayed unusual skill in using them. The especial admirer of the flute was, undoubtedly, Mendelssohn, although the clarinet vied with it in his esteem. Mendelssohn used the flute prominently, at times going so far as to give it passages that would sound better on some other instrument. In his oratorio "Saint Paul," in the chorus of homage to the old gods ("Oh, be gracious, ye immortals"), his use of the flute, which was the religious instrument of ancient Rome, adds a decided touch of realism. In the Reformation Symphony, where he wished to form a gradual climax out of the chorale "Ein feste Burg ist unser Gott," he caused the melody

to be given out softly at first, by the flutes alone. Cherubini, on the other hand, disliked the flute exceedingly, and once made the remark, "The only thing worse than one flute is two."

Two flutes were sufficient for the classical orchestra, but at times even the early composers used more, and we find a flute trio in Haydn's "Creation." While the third flute was formerly considered an extra instrument, both Wagner and Verdi have made it an integral part of the modern orchestra. Berlioz, with his usual exaggeration, has made demands for four flutes, but his figures are not always to be taken seriously. In Verdi's Requiem is a beautiful passage for three flutes, combined with a soprano and alto voice. There is, of course, a large repertoire of solo music for the flute, and any list of flute compositions, however partial, would be incomplete without the name of Kuhlau. This composer lived in the last of the eighteenth and first of the nineteenth century, and wrote so much and so well for the instrument that he has sometimes been called the "Beethoven of the flute."

One of the warmest admirers of flute music was the American poet, Sidney Lanier. He wrote enthusiastic eulogies of the instrument, and

predicted that the time would come when the orchestra would contain as many flutes as it does violins. But the average musician is hardly disposed to agree with this prophecy.

There are several transposing flutes, rarely used, differing from the ordinary instrument only in size and pitch. In fact, the ordinary instrument could be treated as a transposing instrument, as its natural scale is that of D, not C. But it is written as it sounds. The first of the series above this gives the scale of E-flat, with the lowest tone sounding D-flat and giving the name to the instrument. Thus it sounds a semitone above the ordinary flute, and its music is written, therefore, a semitone lower than desired. This preserves a uniform system of fingering. In the same manner the music for the E-flat flute (which gives the scale of F) is written a minor third lower than it actually sounds. One note on the staff, therefore, would have the same fingering on any of the three flutes, but would sound higher on the flute giving the higher scale. The E-flat flute is sometimes called the tierce flute, and has been effectively used by Gade in his "Crusaders." Its tone quality is more crystalline than that of the ordi-

nary flute. Besides ease in fingering, there is still another advantage in the employment of transposing flutes — they allow the frequent use of the natural tones of the instrument, which are always preferable to those obtained by the use of many keys. The subject of transposition will be spoken of again in connection with the clarinets, where it is much more frequent than with the flutes.

There are, at present, no flutes in use that have lower compass than the C flute. The obsolete *flauto d'amore* gave a scale a minor third lower than that of the ordinary flute, beginning, therefore, with A and sounding in the key of B. In recent years Massenet has suggested a bass flute, the projected key of the instrument being A and its lowest tone G. It is a pity that there are no deep instruments of this family, for their soft, smooth quality of tone would certainly be of excellent effect.

The piccolo is sometimes classed as a separate instrument, but in reality it is nothing more than a flute that transposes its music and sounds an octave higher than written. Thus the piccolo part must be written an octave lower than the desired sound. Its very name, formerly *flauto*

piccolo, signifies merely a small flute, and in many orchestras there is no separate player for the instrument, which is then taken by the second flutist.

The lowest C and C-sharp are lacking on the piccolo. Its compass runs, therefore, from D (a ninth above middle C) up to the last B on the piano, — nearly three octaves. The C above this is so harsh that it is absolutely insufferable, and it should never be written.

The piccolo is the shrillest of all orchestral instruments. Its tone-colour is brilliant in the extreme, and it is often used to picture scenes of wild, frenzied merriment. It may well be called the imp of the orchestra; for just as the harp is held typical of the celestial kingdom, so the piccolo is always taken as the type of the infernal regions. Like the flute, the piccolo has three distinct registers. Its lower octave is too weak and hollow for orchestral use, its second octave is bright and joyous, while its upper notes have the piercing shrillness that gives the instrument its satanic quality. The piccolo is most effective in quick, snappy runs or chromatic passages in its higher register.

There are many examples of the use of the

piccolo in its characteristic capacity. Meyerbeer, in the Infernal Waltz in "Robert le Diable," has introduced it with excellent effect. He uses it also in Marcel's great battle-song ("Piff-Paff") in "Les Huguenots" to add martial brilliancy to the occasion. Beethoven employs it in a similar manner in the finale of his "Egmont" overture, where the crisp four-noted runs add incomparable effect to the final cadence.

Mere noise, however, is not the only function of tho piccolo. The older composers knew how to employ it in softer effects, as may be seen from the piccolo obbligatos in the arias "Hush, ye pretty warbling choir" (Handel, "Acis and Galatea"), "Auguelletti che cantate" (Handel, "Rinaldo"), or "With joy the impatient husbandman" (Haydn, "The Seasons"). Gluck, in his "Iphigenie en Tauride," portrays graphically the ravings of the barbarous Scythians by the combination of piccolo, violin, tambourine and cymbals. Spontini, in the bacchanalian passage in "Les Danaides," gains a similar effect with piccolo, cymbals and kettle-drum. Beethoven, in his Pastoral Symphony, imitates the increasing wind of the storm by long, rising notes on the piccolo. Auber has used it skilfully to continue

the register of the flute, and create the effect of an instrument with a compass of four octaves. Verdi has used it freely in connection with Iago's drinking song in "Otello."

Usually one piccolo is sufficient for orchestral demands. But in Caspar's drinking song in the first act of "Der Freischütz" two piccolos, playing in thirds, produce an inimitable diabolic sneer. Spontini, in "Fernando Cortez," has employed two piccolos, and incidentally almost everything else that would make a noise, to accompany the march of the Mexicans. Berlioz, who seems especially devoted to the music of the infernal regions, has again exceeded all previous records, and in the third part of his "Faust" demands three piccolos.

As with the larger flute, there are two transposing piccolos, — one a semitone higher, and the other a minor third above the usual key. Schumann and Spohr have both employed the former, but with this exception these two instruments are found only in military bands.

The flageolet is a survival of the old straight or beak flute type. It forms no part of the regular orchestra, but Mozart, in his "Entführung aus dem Serail," wrote a part for the flageolet in

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G, sounding a twelfth higher than written. In later versions the part is rearranged for the ordinary piccolo. The flageolet, in spite of its small and innocent appearance, is capable of producing the most penetrating effects.[1]

[1] There is an anecdote told of a non-musical minister, who was speaking of the necessity for building up the character thoroughly in every respect, even in the minutest matters. To illustrate the effect produced by the lack of any detail, however trifling, he mentioned as a parallel a conductor who was drilling his orchestra. "During the rehearsal," continued the curate, "the director rapped on his desk, commanding silence, and said, 'Flageolet, you were silent!' In the midst of all the mingled sounds of the orchestra, he had noticed the absence of one tiny flageolet." Waiving the point that the flageolet does not appear in the orchestra, we may be sure that if the director had been unable to tell the difference between its presence or absence, he would certainly have been ready to enter an asylum for the deaf.

CHAPTER VII.

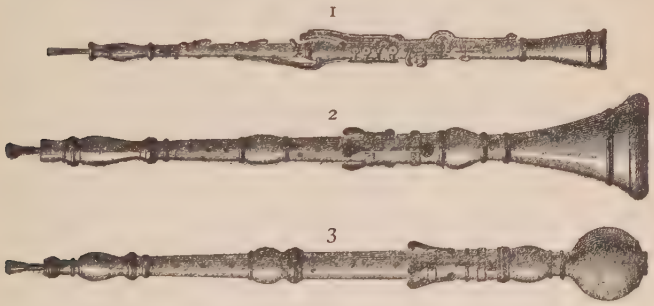
THE OBOE, ENGLISH HORN, AND BASSOONS

Research and discovery have shown that instruments with reed mouthpieces are of the highest antiquity, and have been used in all parts of the globe. The oboe type can be traced in the sculptures and paintings of ancient Egypt and Greece, and specimens are preserved which were found with straws beside them, probably used in making the reed. Other examples of great antiquity have been found in Arabia, ancient America, China, India, and Italy. The oboe is mentioned by mediæval and modern authors under many names, such as schalmei, chalumeau, and shawm. The old oboe was the treble of the family of instruments called bombardi, the predecessors of the present forms.

While the flutes are essentially soprano instruments, the reeds extend over the entire compass of the orchestra, except for the highest notes given by the piccolo. Their tone-colour is much

more varied than that of the flutes, and they are capable of much more expression and dynamic shading. This arises from the presence of the reeds in the mouthpiece.

The double reed, typical of the oboe group, consists of two thin slips of cane, placed together so as to leave a narrow passage for the air, and fastened by silk thread to the thin brass



1. THE OBOE 2. OBOE DI CACCIA 3. OBOE D'AMORE

tube, or staple, which fits into the end of the instrument. The size of the reed varies, that of the oboe being smallest. The larger members of the family are the English horn, the bassoon, and the contrabassoon.

The oboe derives its name from the French hautbois, meaning a high wooden instrument. It is a conical tube, but differs from the conical flutes in being larger at its lower end. It has

always been considered that the conical form brings out more overtones than the cylindrical, and although other things influence the result, this shape certainly does give more strength to the harmonics, and consequently brightens the tone. The oboe part is written in the G clef, and extends from B below middle C to the F two and a half octaves higher. French oboes have an additional key that deepens the instrument to B-flat, but this note, though used by Mendelssohn in his "Midsummer Night's Dream," is usually avoided.

The natural scale of the oboe, like that of the flute, is D major. The three notes below this are produced by keys that close holes near the end of the tube. The second octave is produced from the octave harmonic, obtained by stronger blowing; while the higher notes are obtained by cross-fingering. Though all keys are practicable on the oboe, those which contain many sharps or flats are difficult and ineffective, and florid passages in them should be avoided. Most trills are easy, but those on the lowest and highest notes, besides those which contain two sharps or flats, should be avoided.

The lowest notes of the oboe have a rather

harsh, nasal quality, useful in producing certain effects, but difficult to soften. The middle register is the best, giving a tone that is reedy and penetrating, if not very powerful. The upper notes are thin and somewhat piercing. The colour of the oboe, resembling as it does a shepherd's pipe, is excellently fitted to represent effects of pastoral simplicity, and is much used for this purpose. Besides this quality of innocence and simplicity, it is of use in the portrayal of rustic gaiety and merriment. Still another colour, arising from the artless simplicity of the tones, is that of pathos and grief. The expressive melodic character of the oboe is suitable in all these cases. It is worth passing mention that the older oboes possessed broader reeds than the present ones, and gave a fuller and more nasal tone, not unlike that of a musette. Even at present the older form remains in many German orchestras, and sounds somewhat disagreeable after the lighter tone of most modern instruments, which has been well compared to a silver thread in the orchestral tissue.

One noteworthy point about the oboe is that, unlike most wind-instruments, it demands less than the ordinary amount of breath. The oboe

player, therefore, is often glad to rest his lungs, not from too much work, but from too little. There must be frequent pauses in the music, to enable him to exhale. In modern scores this fact is usually taken into consideration, but the older composers were often careless about it. Bach, especially, has written some solo passages for the instrument that are almost impossible because of their length. In more modern times, Schumann has committed the same error; and in the second of his three romances for oboe and piano there is a passage of eighty-four bars for the soloist without a single rest.

ITALIAN PEASANT PLAYING MUSETTE

There is not much solo music in existence for the oboe. Handel wrote a set of six concertos for it, which are still given occasionally. Mozart wrote one also, but the score has been lost or mislaid. Kalliwoda wrote for it a concertina, or

small concerto, — a rather misleading name, as the piece has considerable length and difficulty. Beethoven has written a trio, with four complete movements in symphonic form, for the unusual combination of two oboes and an English horn. In recent years, Arthur Foote has produced a set of three pieces for oboe and piano.

Owing to its incisive tone, the oboe has always been a favourite with orchestral composers, and it is in symphonies, oratorios, and similar works that the instrument shows at its best. The scores of Handel abound with fine passages for it, and in his day it seemed almost to vie with the violin as the leading instrument. In his orchestras, in fact, there were almost as many oboes as violins. Haydn's works show an equally copious use of the oboe. With him, however, it is more of a solo instrument, usually in light and playful melodies. Generally it does antiphonal work with the bassoon in the trios of his symphonies, but there is an expressive adagio for it in "The Seasons," and also a long and difficult solo for it, in the eleventh number, in which it imitates almost exactly the crowing of the cock. St. Saëns, at a later date, used it for a similar purpose in his "Danse Macabre," where the revels

of the riotous skeletons are brought to an abrupt end by the bird of dawn. Mozart employed it freely, and in the "Benedictus" of his twelfth mass there is a really great solo for it. This may not be Mozart's doing, however, for the composer's authorship of the entire work has recently been doubted. Gluck has used the instrument in his operas with consummate skill, and its effects of pathos are employed in many beautiful phrases.

No composer has made more frequent and varied use of the oboe than Beethoven. It has prominent passages in his great Masses in C and D. In the symphonies, it leads in the funeral march of the "Eroica" with telling effect. He understood, too, that its mournfulness, if given too great prominence, will degenerate into a lachrymose whining, and we find him avoiding this excess by giving the theme afterward to the fuller-toned 'cellos. In the scherzo of the Pastoral Symphony is a long solo for oboe, giving full rein to the rustic merriment of the occasion, for the movement represents a village festival. In the scherzo of the ninth symphony are several effective oboe passages. In the opera of "Fidelio," where the hero, Florestan, is alone

in his prison cell, there is a famous oboe theme. Florestan is awaiting death by starvation, — a rather distant prospect, to judge by the size of most of the operatic singers, — and while he meditates upon his sad plight, the oboe pours forth the theme of his lamentation, afterward to be taken up by the voice. In the third entr'acte of the "Egmont" music there is a good example of the use of oboe in more florid melody.

Spohr, too, understood the instrument, and in his "Jessonda" there is a prominent legato passage for it. Raff gives to the oboe the entire opening theme in the finale of his fourth symphony, with a single flute note for accompaniment. Schubert, in his E-flat mass, produces a novel effect by combining its low notes with soft trombone chords. In Mendelssohn's 42d Psalm, in the air "My soul thirsteth for God," is one of the most effective oboe solos ever written. Cherubini, in his "Elisa," has written a passage for oboe in the most ornate style, demanding nearly the entire compass of the instrument. Auber, in "Masaniello," gives an excellent example of staccato work on the oboe, — a result which must be produced by actually placing the tongue against the reed, and there-

fore cannot have the varied effect of multiple tonguing on the flute. Berlioz, in his Symphonie Fantastique, introduces an effective dialogue between oboe and English horn, representing a shepherd and shepherdess in the fields.

The oboe gives the pitch to the entire orchestra, all the other instruments tuning to it. It was the least tunable instrument in Handel's day, and the custom dates from that time, although the clarinet, which has entered the orchestra since then, is even harder to tune. Besides this difficulty, there is another that oboe players have to contend against, — the expansion of the instrument from heat, and a slight alteration of its pitch in consequence. This trouble affects all members of the wood-wind group.

The oboe is not now a transposing instrument. In Handel's "Flavio" there is a song in B-flat minor, with an oboe part written in A minor, implying the existence of an oboe a semitone higher than usual. But this instrument is not found elsewhere. The old oboe d'amore, so common in the works of Bach, was a minor third deeper than the ordinary form, and possessed of a richer tone. Its work is now usually given to the oboe, but the larger form has been recon-

structed for the purpose of playing the scores of Bach correctly.

Another older form now obsolete was the oboe di caccia. This existed in two keys, a fifth and a sixth below the small oboe. The oboe di caccia was not a real oboe, however, but rather a smaller form of the bassoon. Haydn used it at a much later date than Bach, and even in the time of Rossini we find it taking the beautiful Ranz des Vaches, in exact imitation of the alpenhorn, in the overture to "William Tell."

The English horn, the second member of the double-reed group, is simply an oboe enlarged by half, and gives in consequence a scale a fifth deeper. In order to preserve the same fingering, its music is written a fifth higher than it actually sounds. Thus it is interchangeable with the oboe, as far as the technique of playing is concerned, and in those orchestras that do not have a separate performer for the English horn, the second oboist can play it as if it were an oboe without change of method. In a piece in C, for example, the oboe part will be in that key. The English horn part, however, will be written in G, but will sound in C. If written in C, it would

sound in F. The advantage of this transposition is not apparent at first glance, but where there are forms of instruments in several keys, the player may pick out the one that will give the fingering of the natural scale, or at least one nearly related to it, thus making his own work easier and producing better tones.

The English horn is not a member of the horn family, but receives its name from the fact that it was derived from an old English instrument named the hornpipe. The hornpipe consisted of a tube, with reed mouthpiece, having at its lower end a "bell" of horn. The instrument was in use several centuries ago, at least, for Chaucer mentions it in his "Romaunt of the Rose":

> "Controve he wolde, and foule fayle,
> With hornpipes of Cornewaile."

The word "Controve" means to compose, or improvise, and is derived from the same root as "Trouvère." That the hornpipe was none too pleasing in tone may be gathered from some preceding lines, where the poet says:

> "Yit would he lye,
> Discordaunt ever fro armonye,
> And distoned from melodie."

Some scholars imagine that Chaucer may have written "cornpipe" instead of "hornpipe," deriving the name from the cornstalk often used in making rustic pipes, just as chalumeau, shawm, and other forms come from the Latin *calamus*, a reed. But corn may also be derived from *cornu*, the Latin for horn, — a root seen in our word "cornet." The English horn itself is called the *cor anglais* in French.

1. ENGLISH HORN
2. OLDER FORM

The natural scale of the English horn is that of G major, and its two extra keys bring its lowest tones down to E below middle C. From there its compass extends upward two and a half octaves to B-flat. As on the oboe, its first natural scale is produced from the full tone of the instrument, its second octave from the first harmonic, and its highest notes by cross-fingering, or opening the upper holes while stopping the lower ones, to produce short vibrating segments of air. Its music is written in the G clef.

Its quality of tone is more full and less pier-

cing than that of the oboe. It does not lend itself so well to the gaiety of pastoral strains, nor is it suited for the expression of keen grief and anguish. It is, however, excellent in portraying a dreamy melancholy, and its full, noble tones are imbued with tenderness and sentiment. Its middle and lower notes, especially, are rich and sonorous.

The older masters knew little of the English horn. It is now used in Bach's Christmas Oratorio, and in the Passion Music, but only to replace the old oboe di caccia. Haydn and Mozart called for it a few times, though some authorities say they never did so. Gluck used it, but without apparent knowledge of its powers. Beethoven, Schubert, Weber, and Mendelssohn did not call for it at all, the Beethoven trio already mentioned having probably demanded an oboe di caccia instead of the English horn. It would have been most appropriate after the storm in the Pastoral Symphony, instead of the clarinets and horns which Beethoven employed in that scene. Schumann, too, avoided it, although his one solo passage for it, in the "Manfred" music, is remarkably effective. Manfred, the restless seeker after oblivion, is alone upon

the Alpine cliffs in the morning. His meditations are interrupted by the sound of a shepherd's pipe, and this is given on the English horn while Manfred recites the words:

> "Hark! the note,
> The natural music of the mountain reed —
> For here the patriarchal days are not
> A pastoral fable — pipes in the liberal air,
> Mixed with the sweet bells of the mountain herd;
> My soul would drink those echoes. — Oh, that I were
> The viewless spirit of a lovely sound,
> A living voice, a breathing harmony,
> A bodiless enjoyment — born and dying
> With the blest tone which made me!"

The effect of the notes mingling with his voice (for this part of "Manfred" is a true melodrama, or spoken monologue with musical accompaniment) is one of extreme beauty.

Cowen, in his Scandinavian Symphony, has employed the instrument with the utmost felicity to depict the gloomy melancholy that broods over the wild and impressive Norwegian fiords. No other instrument could so well portray the large sense of vague loneliness inspired by their aspect.

The French composers seem to have been the

first to appreciate this instrument. The Ranz des Vaches in the "William Tell" overture, written for oboe di caccia, is now effectively given on the English horn. Meyerbeer used its deep tones with telling effect in the grand duet in the fourth act of "Les Huguenots." Berlioz, in his Symphonie Fantastique, after picturing the dialogue between his shepherd and shepherdess, by means of English horn and oboe, causes the former to continue the theme, this time with no response but that of distant thunder, given by the kettle-drum, — an admirable effect, suggesting a tragedy wrought by the storm. Wagner, too, understood its use as a shepherd's pipe, and in "Tannhäuser" the hero, after emerging from the cave of Venus, finds an excellent English horn player tending the sheep in the fields by the Wartburg. All the most modern composers make the instrument a part of the regular orchestra, and use it frequently. One excellent example of its exquisite melancholy is found in the tender melody that begins the slow movement of Dvorak's American Symphony. This is but one of many in modern scores, for the tone-colour of the instrument is almost indispensable to-day.

ANTONIN DVORAK

The bassoon is probably an instrument of great antiquity, although there exists evidence of its discovery in 1540 by Afranio, a canon of Ferrara. The name bassoon, at first sight, would appear to indicate an instrument taking the bass part, just as the word tenoroon was used to designate an old tenor oboe. But the Arabians had the term *Besuin*, while the Egyptian word for deep-toned pipe is *Zummarah-bi-soan*. The manner in which the term *Busaine*, or *Buisine*, is used in mediæval manuscripts, indicates an Oriental origin for the instrument. The Italian name for it, fagotto, comes from its fancied resemblance to a fagot, or bundle of sticks. It is probable that some instrument of this type existed among the *auloi* and *tibiæ* of the ancient world. The Grecian march to execution, for instance, known as the "Nome of Kradias," is described as taking place with flute accompaniment; but it may well have drawn its impressive character from some deep and sombre precursor of the bassoon.

The instrument consists of a tapering tube, doubled upon itself, with a brass crook to hold the mouthpiece. It seems to have grown by accident instead of by scientific research, and its scale is singularly capricious. All attempts to

improve it seem either to diminish its flexibility in quick passages or to impair the peculiar quality of its tones. The natural scale of the instru-

1. THE BASSOON 2, 3, 4. OLDER FORMS

ment is that of G major, but it has several extra keys which, by closing holes, enable it to get down to B-flat, over two octaves below middle C. From that note its compass extends to A-flat above middle C, — nearly three octaves. It is written in the bass and tenor clef. As in the previous cases, the octave harmonic forms the basis of a scale, and the highest notes are obtained by cross-fingering. The lower register forms an excellent bass to the wood-wind quartet (flutes, oboes, clarinets, and bassoons), the middle register is dull and lifeless, while the upper tones have a penetrating power that is not unlike a cry of human agony. The colour of the bassoon is grave and solemn, while its tones lend themselves well to grotesque effects also. It has been frequently used in the latter capacity, and may well be termed the clown of the orchestra.

Many trills, especially at the extremes of the compass, are impossible on the bassoon. Rapid passages may be successfully employed, however, and they sound especially well in the favourite keys of the instrument, — those related to G major. Examples of such passages may be found in the second act of "Les Huguenots," or in Mozart's concerto for the instrument. Stac-

cato notes are often used, and generally with good effect, as for instance in the allegro of Beethoven's fourth symphony.

Probably first used as a bass instrument, as in Cambert's "Pomone" (Paris, 1671), the bassoon has gradually risen to a higher position. This is due partly to the introduction of still lower instruments, and partly to the improvements in its own high tones, which are so expressive that they are often called vox-humana notes. Even in Haydn's time these upper notes were appreciated, and in the minuet of his Military Symphony is a long melody for them. Also in the "Creation" are prominent passages for them. The bassoon came into its rights at this epoch, for in the earlier works of Handel it is little used. One notable example of its employment, however, is found in his "Saul," where the Witch of Endor raises the ghost of Samuel amid effective phrases on the bassoon. Even Bach sometimes departed from the early custom of using it merely to reinforce the bass part. In the time of Mozart, the instrument was in full possession of its proper privileges, and we find him using it with inimitable drollery, in his G-minor symphony, to imitate a violin figure.

Beethoven showed unusual fondness for the bassoon, which was, in fact, his favourite instrument. He employed it constantly, in all his greatest works, and understood its tone-colour thoroughly. All through the symphonies we find it used continually, and in the first movement of the eighth it is employed with exquisite humour. But its most comical effects are found in the Pastoral Symphony, where the music of the village band is aided by a bassoon player, evidently exhilarated by something besides the joy of the occasion. He has seen better days, but in the course of time has fallen into an evil plight, and his instrument, now old and battered, possesses only three keys. He endeavours to make the most of these three notes, however, and comes in heavily with them every time they are needed, and a few times when they are not.

The humour of great composers would readily form a book in itself, and not the least interesting chapter of it would be their use of the instruments in producing comical effects. Even the great Bach, earnest and devout as he was, had his moments of play. He did not show this in his scoring, but he has left us the amusing "Coffee Cantata," in which a wilful daughter refuses to

give up her passion for coffee, and perhaps also for the gossip that is connected with the usual German "Kaffee-Klatsch." The father entreats and threatens in vain, and at last succeeds in weaning her from her beloved beverage only by promising to get her a husband.

Haydn was certainly possessed of a humourous disposition. Mirth and playfulness speak in many of his themes, even in his more ambitious works. In one of his symphonies he has introduced a decided practical joke. This composition, No. 3 of the Salomon set, in G major, is now generally known as the Surprise Symphony. The andante consists of variations on a soft and simple theme, and after the melody has been played a second time, even more softly, there comes a sudden fortissimo crash upon the kettle-drum supported by full orchestra. "That will be sure to wake the people," said Haydn himself, evidently realising that the charms of Morpheus are more potent than those of Cecilia.

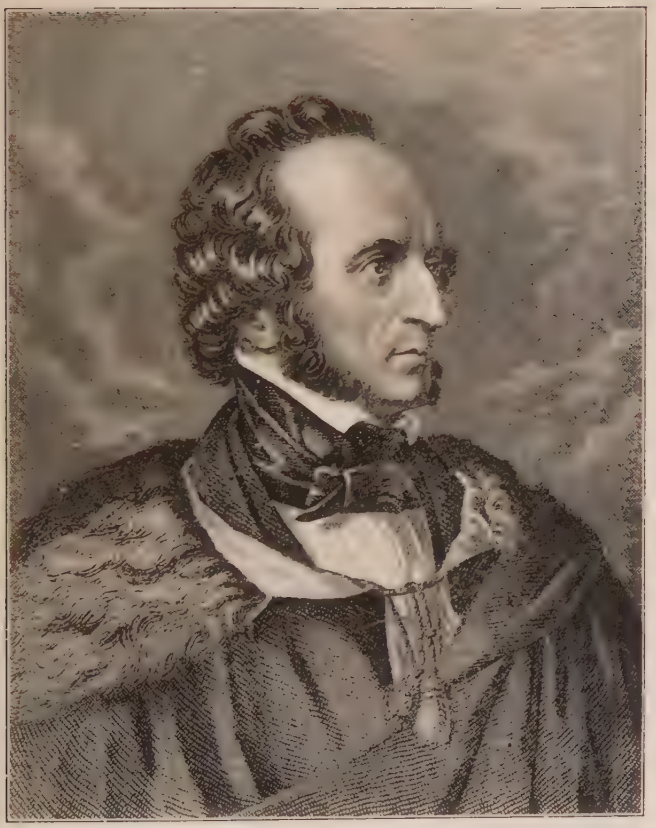
Another of his works is the so-called Toy Symphony. This is nothing less than an actual symphony, in small but regular form, for a set of children's playthings, accompanied by the piano. A tiny drum, a toy trumpet, a cuckoo

whistle, a nightingale, and several other juvenile instruments are blended in a manner so successful that many composers since his time have adopted this style of musical jesting.

Still another of his symphonies displayed his ready wit in handling the instruments, although the occasion came near being a mournful one. Haydn had for a long period been leader of the private band supported by Prince Esterhazy, at Eisenstadt. That liberal patron of music gave the composer absolute freedom, and supported him in ease and comfort. It may well be imagined, then, that Haydn heard one day with sincere regret the news that the prince was going to discharge his band in order to make a much-needed financial retrenchment. Our composer soon completed a symphony to be played at the final appearance of the organisation, and rehearsed his men for the occasion. The time arrived at last, and in the midst of a brilliant assemblage the music began. At first the themes were bright and lively, but soon their cheerfulness seemed to ooze out, and they became sad and plaintive. A player in the rear of the orchestra was seen to blow out his candle, take up his instrument, and leave the room. Soon another followed his

example, and yet another. The gloomy strains continued, and still the musicians kept going out, until at length only the first violinist remained. After a few final wails on his instrument, he, too, departed, and Haydn, turning toward the prince, bowed his head and laid down his baton. "What does all this mean?" cried the nobleman. "It is our sorrowful farewell," replied Haydn; and since that time the work has been known as the Farewell Symphony. The prince was so moved that he revoked his previous dismissal, and kept the band for the rest of his life.

Mozart, most genial of men and composers, has imbued his operas with delicious humour. A more purely instrumental bit of fun, however, is found in his "Musikalischer Spass," or musical joke. In this he parodies the efforts of a young and untrained composer to write an ambitious work. The flimsy character of the themes, and the marvellous attempts at development, are both excellent touches, but the climax is reached when the inexperienced musician attempts to end with a fugue. The subject is announced pompously, then the answer and counter-subject follow, but after that his skill and courage begin to fail him. He flounders about in orchestral confusion for



FELIX MENDELSSOHN

a time, and finally beats a retreat in a blare of noise on the horns, with which he tries to conceal his discomfiture.

Beethoven was not lacking in humour, in spite of his shy and lonely nature. His wit often became fierce and sharp, and it was usually brusque rather than delicate. He first used the scherzo, the playful movement of modern symphonies; but even in this there is always a vigour and dash that is spirited rather than gay. His symphonies abound in grotesque effects, and not a few of these are found in the bassoon passages. To a man of Beethoven's character this instrument must have appealed with especial force.

For true daintiness in musical humour, Mendelssohn must be awarded first honours. Especially delightful are the many happy touches in his "Midsummer-Night's Dream" music. Mendelssohn understood the bassoon well, and made abundant use of its powerful lower register; but he employed it best in its more humourous capacity. Instances of this are the quaint clowns' march for two bassoons in thirds; the imitation of a country band in the funeral march, with the bassoon making a comical cadence by itself on a low note; and, in the overture, an accurate

imitation of the braying of the transformed Bottom, upon the same instrument.

Rossini's youthful setting of "I Due Bruschini," in which he made the players go through all sorts of antics to gratify a grudge against his theatre manager, is well worthy of mention among instrumental jokes. The Parisian composers, too, were not without their appreciation of fun, as is shown by Gounod's drollery in his "Funeral March of a Marionette." St. Saëns, in his "Danse Macabre," has also produced many bizarre effects. That symphonic poem is nothing less than a musical representation of the Dance of Death. After midnight has sounded on the harp, the skeletons rise out of their graves. Then Death tunes up his fiddle, using the discordant diminished fifth already described. After this he starts in with the dance, and in the midst of the revelry comes a series of strokes on the xylophone, imitating the sound of the skeletons' bones as they are knocked together in the confusion. The end of this wild scene at dawn, when the cock crows on the oboe, has already been mentioned.

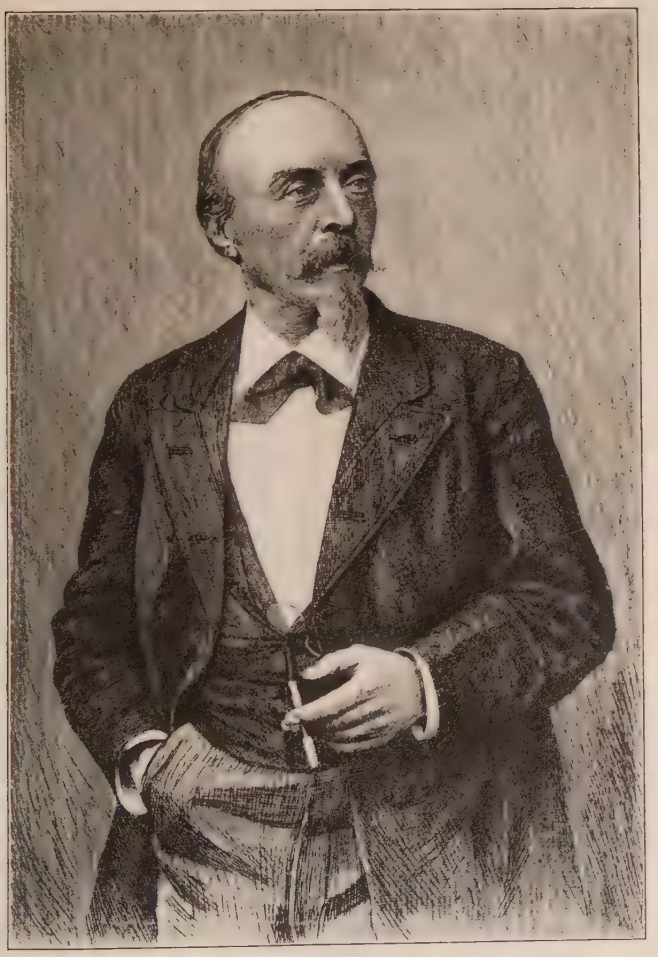
Wagner's sense of humour compels unbounded admiration, and is worthy to rank with that of

Shakespeare or Aristophanes. It is especially in evidence in the "Mastersingers," which would have made a superb comedy without a single note of music. But the orchestral score, too, is full of delightful bits. The tapping of Hans Sachs's hammer as he mends his shoes during Beckmesser's attempt at a serenade, the terrific efforts of Beckmesser to recollect the melody of Walther's Prize Song, the confusion of themes during the burlesque riot scene, the discordant horn of the belated and frightened watchman, and the fierce blast of pain when the sorely beaten Beckmesser forgets himself and tries to sit down, are but a few of the many ludicrous touches. In the prelude, too, there is much that has its significance. The whole plot of the opera hinges on the failure of the hidebound Mastersingers to recognise the real poetic beauty of Walther's art, and this is foreshadowed in the orchestra. After some of the themes have passed in review, the pompous Masters' motive begins to reassert itself. It will brook no interruptions from the more inspired phrases of Walther's music, but sounds forth on the wood-wind, obstinate, fusty, and endowed with inimitable self-sufficiency. Again the violins repeat the

beautiful phrases of the trial song, but in vain; the Masters' theme keeps on in its blind course, until there is almost a free fight in the orchestra between the strings and the wood-wind.

The bassoon once enabled Von Bülow to get rid of an unwelcome audience. It was at a rehearsal, and some insistent ladies had forced an entrance, in hopes of being allowed to stay for the music. Seeing that they did not go, Von Bülow, who was conducting, turned to his orchestra and said, "Gentlemen, we will take the bassoon part first." He gravely conducted through thirty-two measures of rests, when a couple of grunts announced two notes for the instrument. Then came sixty-four more measures of rests. Finally the leader looked around, and found to his satisfaction that the uninvited auditors had taken the hint and fled.

The Parisian composers, too, were not afraid to use the bassoon freely. Cherubini, in his opera "Médée," wrote one of the finest solos for it in existence. Meyerbeer, in "Robert le Diable," produced a wonderful passage from its middle register. In the opera, Robert is sent to



HANS VON BÜLOW

pluck a branch of cypress from his mother's grave, which he does amid the rising of the spirits of faithless nuns. Just before the ghostly forms appear, the dull, hollow tones of the second bassoon scale give an effect that is absolutely bloodless in its weird, sepulchral character. Berlioz, with his usual inordinate demands, called for no less than seven bassoons in his "Damnation de Faust." But he atoned for this excess by writing excellent music for the instrument, as his use of it in the Symphonie Fantastique shows. In the fourth movement of that work, the low but constant mutterings of the bassoon give a wonderful impressiveness to the music, and seem to picture the mad footsteps of the crowd surging about the victim as he proceeds to his doom.

In more recent times, Professor Paine has used the instrument with appropriate effect in his Tempest Fantasie. It is there employed to depict the character of Caliban, and its deep, clumsy tones are eminently well fitted to represent the awkward, savage man-monster of the magic island. Ambroise Thomas has employed a similar procedure in his stage setting of this most delicate of comedies. This adaptation of Shakespeare's

"Tempest" as a French ballet is hardly a spectacle that can appeal to the Anglo-Saxon intellect; but even a bad play may contain good orchestral effects.

There is a diminutive bassoon, called the basson quinte, which sounds a fifth higher than the ordinary instrument. It is of the transposing variety, and its music must therefore be written a fifth lower than desired, as the bassoon fingering will produce the higher tone wanted. Its upper two octaves are well replaced by the more expressive but less powerful notes of the English horn. It is not at present in the orchestra, although it might be employed to soften the tone of the deeper instrument.

The contrabassoon is a larger instrument, with a conical tube about sixteen feet long. This gives the octave below the bassoon, just as the double-bass gave that below the 'cello. The contrabassoon is therefore the deepest instrument of the orchestra, extending down to D below the bassoons, and sometimes even reaching B-flat, — the lowest note but one on the piano. The available compass of the instrument is about two octaves upward from its lowest D; a few higher notes are possible, but can be obtained

with better effect from the ordinary bassoon. It is a transposing instrument, sounding an octave deeper than written.

1. THE SARRUSOPHONE 2. FRENCH CONTRABASSOON
3. GERMAN CONTRABASSOON

The contrabassoon forms a broad and noble bass for the wind-instruments, and sounds not unlike some great organ pipe. Owing to its size, rapid passages are not effective upon it, although Beethoven has written some quick phrases for it

in the ninth symphony. It was first used by Handel, in his anthems for the coronation of George II. in 1727. Haydn has introduced it into his "Creation," where, in company with two bassoons, it represents the footsteps of the heavy beasts who first trod the earth. Mozart used it in a nonet for wind-instruments, and Spohr did the same. Beethoven employed it often, perhaps the most noteworthy passage being its obbligato, in combination with the two bassoons, in the grave-digging scene of "Fidelio." Beethoven's care in obtaining the proper effects, as well as his irascible temper, is shown by an incident of the "Fidelio" rehearsals. The third performer was one day absent, at which the composer became furious. After the rehearsal, Beethoven could not restrain himself from shaking his fist and hurling imprecations at the house of his generous patron, Prince Lobkowitz, because the latter had dared to suggest mildly that perhaps two players were enough.

In recent years an attempt has been made to adapt reed mouthpieces to brass tubes. The resulting instruments have not entered the orchestra, but are effective enough in their way. One of them, called the sarrusophone (after its

inventor, M. Sarrus), is provided with the usual keys for wood-wind, and has a bassoon reed, which makes it practically a member of the oboe family.

CHAPTER VIII.

THE CLARINETS

In the wind instruments of the last chapter, the tone was produced by the vibrations of two small pieces of reed bound together. The clarinets differ from the oboe family in having one large reed instead of the two small ones. This reed consists of a broad strip, narrowing at the top to an extremely fine edge. Formerly attached by waxed cords, it is now bound to the mouthpiece by a double metallic band, provided with small screws. The player presses the reed against his lower lip while producing the tone. The vibrations of the reed set in motion the air column inside of the tube, as in the double reed instruments.

The clarinet, deriving its name from the old Italian clarino, or trumpet, was practically invented by Johann Christopher Denner, of Nuremberg, in 1690, although it is probable that the older instruments known as shawms

were of this type. Except for the mouthpiece at one end and the expanding bell at the other, the clarinet tube is entirely cylindrical. The old type has been improved by Stadler, of Vienna, and in recent times by M. Sax, of Paris. Klose, in 1843, applied the Boehm system of keys to it, but this system is less applicable to clarinets than to flutes and oboes, because a cylindrical tube produces different effects from a conical one. Other reasons than the shape of the tube have been advanced, but the result remains the same; while the flute and oboe act like open pipes, the clarinet behaves like a stopped pipe, or one that is closed at one end. One of the results of this fact is the production of a tone an octave deeper than that obtained from an open pipe of the same length. Another effect is the formation of only half the harmonic series of overtones. Thus, on the flute and oboe, an increase of pressure in blowing causes the column of air to subdivide and produce the octave of the fundamental tone. On the clarinet, however, the "overblowing" does not produce the octave, but causes a subdivision of the air-column into three parts, thus producing the twelfth, or fifth above the octave. In the higher notes

of the harmonic series, also, every other overtone is left out. Thus, the Boehm fingering, which repeats for the higher octave, cannot be directly applied to the clarinet.

THE CLARINETS
A, B-FLAT, AND C

Like the flute and oboe, the clarinet has six holes, covered by three fingers of each hand, which give the natural scale of the instrument when released in succession. This scale is that of G major, a fifth deeper than the tones of the flute. The closing of certain holes in the lower end of the tube, by means of keys, produces three lower semitones, so that the compass begins with E below middle C. The usual keys for sharps and flats add the chromatic intervals, so that the first octave extends from G up to F-sharp. By overblowing the lowest E, the B a twelfth above it is produced. The four semitones between the F-sharp and this B, then,

must be specially arranged for on the clarinet. The first one, G, is obtained by releasing a hole previously covered with the left thumb, while the others are produced by keys which open holes in the upper part of the instrument, near the mouthpiece. The usual fingering continues upward from the harmonic of the twelfth, while still higher notes are based upon the upper overtones, produced by cross-fingering.

The compass of the clarinet is usually divided into four registers. The lowest includes the fundamental scale; the second, or medium, consists of the few extra notes, bringing it up to B; the third, or acute, is the scale on the first harmonic produced, while the fourth, the highest, is obtained from the upper overtones or partials. The whole range is from E below middle C, to C three octaves above it. The clarinet is notated in the G clef. The lower register, sometimes including the medium, is called the chalumeau, after an obsolete wind-instrument which preceded the clarinet and was used in Handel's time. It has a rich, full, and rather reedy tone. The acute register is full, round and clear, while the extreme high notes are too piercing for frequent use.

The clarinet is the most expressive of all wood-wind instruments, for the reason that it is capable of the most perfect gradations in the power of its tones. Any dynamic force, from the softest to the loudest, is possible upon it, and hence its value in the orchestra.

The clarinet is the best example of the use of transposing instruments. Owing to the complexity of fingering on the clarinet, it is extremely difficult to play the instrument in keys containing more than three sharps or flats in the signature. Nearly all trills are practicable, but some are impossible, because the same finger would have to skip from one key to another. Rapid passages in the middle register are difficult because of the fingering, while phrases that frequently cross the "break," or change in pressure of blowing, can never be played swiftly.

It is to obviate these difficulties that clarinets are made in different keys. The compass and fingering already described belong to the clarinet in C, which sounds its tones as they are written. The others used at present in the orchestra are the B-flat clarinet, giving its scale a tone lower than the C clarinet and sometimes called simply

the B clarinet,[1] and the A clarinet, giving its natural scale a minor third below that of the usual instrument. Thus, a passage that included the break on one clarinet might lie wholly above or below it upon another instrument, and so be perfectly practicable.

It is in rendering easy the performance of music in various keys that the different clarinets find their chief use. Thus the C clarinet can play in C, G, D, F, or B-flat, or the relative minors, without using more than two sharp or flat keys to form the diatonic scale. In B-flat, however, the B-flat clarinet gives the proper result when its finger-holes are uncovered, without the need of pressing any of the keys. Its music, however, is written in the key of C, so that for a piece in B-flat the performer need only take his B-flat clarinet, using the simple fingering of the scale of C and allowing the instrument itself to do the work of lowering the tone. The B-flat clarinet part would be written in F for a piece in E-flat, or in B-flat for a work in A-flat, thus allowing the performer to use two flat finger-keys, while with the C clarinet he would need four.

[1] The name "B clarinet" comes from the fact that in Germany B-flat is known as B, while B-natural is called H.

Music in D-flat, written in E-flat, is the only instance where the player needs more than two keys.

The case is similar in sharp keys. If the C clarinet be used for music in A, the performer must employ three sharps. But if he takes an A clarinet, all that he needs to do is to finger for an open scale on the instrument, which allows him to play the key of A exactly as he would play C on a C clarinet. As his fingering is that of the usual C scale, his music is written in C, while the instrument makes it sound in A. To sound music in E or B, the player fingers for G or D, in which his music is written, again allowing the instrument to do the work of altering the pitch. F-sharp is the only case where he needs three sharp finger-keys (with the music written in A), for C-sharp is the same as D-flat, obtained with three flat finger-keys from the B-flat clarinet. Thus in orchestral scores the composer must choose the instrument suitable for the music, and if it transposes downward, he must write the part higher than it is to sound, or vice-versa. The clarinetist may thus change his instruments without altering his fingering system.

There are other reasons besides ease in fingering which influence composers in their selection

of clarinets. The C clarinet, for example, is not used nearly as much as the other two, because it does not equal them in sweetness and richness of tone. The B-flat clarinet is the most brilliant of the three, and as a result it is most frequently used in solo work. The instrument in A, on the other hand, has an especially full and tender quality of tone. For this reason it has been called into requisition by Mozart and Brahms, for instance, in their clarinet quintets.[1]

The tone-colour of the clarinet varies according to the register, but is especially important in two cases. The ordinary notes of the second scale are full and clear, lending themselves well to effects of strong, almost heroic, emotion. These tones are not unlike those of the human voice. Its lowest, or chalumeau, register is sombre and weird in effect, and lends itself well to gloomy and spectral scenes.

[1] The difference between the two lower instruments is not as great in reality as it seems on paper. Meyerbeer, while conducting one of his own operas at Stuttgart, found occasion to reprove the clarinet player for using the B-flat clarinet when that in A was demanded by the score. When Meyerbeer insisted upon having the latter instrument, the performer laid down his clarinet, then took it up again, blew through it as if to warm it up for playing, and began his part. "There, gentlemen," said Meyerbeer, "that is the colour I had in mind."

It is possible for a player to change his instrument during a concert, but the composer must always allow him a few bars' rest for this purpose. The clarinet is more sensitive to heat than any other orchestral instrument, however, and will be out of tune unless the performer has had time to warm the tube with his breath before playing. The clarinet is the least tunable of the instruments, and therefore should give the pitch for the orchestra. It does this in some English bands, but usually the old custom of tuning to the oboe still holds its own.

The process of tuning up is not the most agreeable thing in the world to listen to, even though a Chinese dignitary did once take it for music, and begin praising it. As much of this work as possible should be done before the concert, but even with this precaution there is a good deal of noise in the final adjustments. The oboe-player blows several long blasts, giving the note A on his instrument. The violinists commence tuning their A-strings, and the other members of the string band follow suit. Then they begin putting their other strings in pitch, producing a series of empty fifths and fourths that would shock any orthodox teacher of harmony. The

clarinetists begin "tootling," as much to warm up the tubes as to set them in pitch by adjustments. The other wood-wind performers do the same, while a series of subdued grunts from the tubas and other brasses adds new and piquant effects to the general mixture of tone.[1]

One danger in the use of the clarinet lies in the fact that if the tone breaks, a series of so-called "couacs," or noises, are produced, which are far more harsh and noticeable than mistakes upon any other instrument. The trouble is not always due to the performer's lack of skill, however, for a bad reed in the mouthpiece is often sufficient to bring about this unmusical result.

The clarinet was the last instrument to enter the classical orchestra. Johann Christian Bach, son of the great Bach, is mentioned as the first

[1] The composer Handel was especially sensitive to the troubles of the tuning-up period, and arranged to have it take place entirely before the audience entered the concert-room. On one occasion some one with an inclination for practical joking gained access to the place where the instruments were kept, all ready-tuned for the occasion, and proceeded to put every one of them out of tune. In due time Handel and his men arrived, and took their places amid the usual applause, but without discovering the trick. The signal for the opening chord caused a terrific crash. The composer became frantic at the discord, and after upsetting a drum and a double-bass, he rushed from the stage in anger to seek the offender who dared to take "such a vicked liberty." But the culprit was never discovered.

composer to use it, as he introduced a clarinet part into his "Orione" in 1763. But there exists an incomplete overture by Handel, for two clarinets and a corno di caccia, which must of necessity antedate Bach's composition. Handel also experimented with the older form known as thechalumeau, and Gluck used it in his early Italian scores. Haydn has given the clarinet some effective solo passages in "The Creation" and "The Seasons," but Mozart was the first to bring out its full possibilities, and his own words show his admiration for it. "Ah, if we had clarinets, too," writes he in one of his letters; "you cannot imagine the splendid effect of a symphony with flutes, oboes, and clarinets." Besides his quintet for clarinet and strings, he wrote a concerto for the instrument, and used it freely in all his later operas. His great E-flat symphony, written in 1788, is sometimes called the clarinet symphony, from the fact that this

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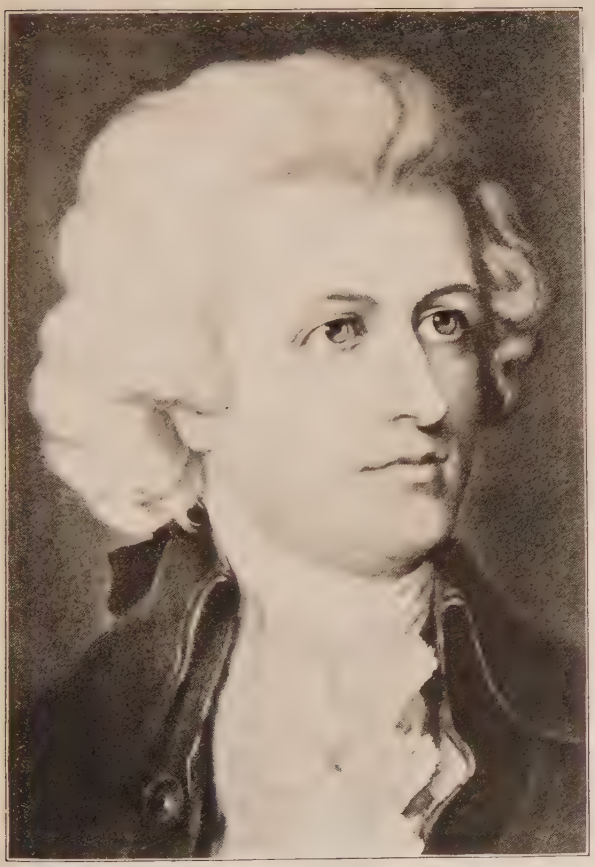
1. BASSOON MOUTHPIECE
2. OBOE MOUTHPIECE
3. CLARINET MOUTHPIECE



WOLFGANG MOZART.

instrument is employed prominently, even to the exclusion of the usual oboes. The absence of clarinets in many of Mozart's most famous symphonies is doubtless due to the smallness of the court orchestra which he had at his disposal. The clarinet parts now found in Handel's "Messiah" were introduced by Mozart, among them the wonderful hesitating, almost groping, effect of the accompaniment in "The people that walked in darkness."

Beethoven wrote scarcely a single orchestral work that did not contain clarinet parts. The slow movements of his second and fourth symphonies are full of melodious clarinet passages. In the Pastoral Symphony it imitates the call of the yellowhammer; near the end of the first movement of the same work is a more difficult and brilliant phrase, which includes the "break" of the instrument; while after the thunder-storm the shepherd's call is given to the clarinet, with horns. Schubert, too, used the clarinet freely and with evident fondness for it. A little later, Weber displayed even greater partiality for it, and the wonderful chalumeau effects in the supernatural scenes of "Der Freischütz" bear witness to his knowledge of the instrument.

Mendelssohn, too, was especially devoted to the clarinet. The opening notes of "Elijah," the introduction to the Scotch Symphony, and the powerful chords in the "Ruy Blas" overture are all in the chalumeau register, and he evidently admired the fulness and resonance of these tones, which can balance even the trombones. In all his works the clarinet takes a prominent part, and its passages are generally easy and fluent. Excellent examples are the lovely second theme in the "Hebrides" overture, the imitative work for two clarinets in the "Melusina" overture, and the rolling, wave-like phrases in the "Calm Sea and Happy Voyage." There are also passages of extreme difficulty, such as those in the scherzo of the Scotch Symphony and the saltarello of the Italian. Even harder, almost impossible, in fact, is a short chromatic phrase in the scherzo of the "Midsummer-Night's Dream," consisting of rapid sixteenth notes lying just in the "break" of the instrument. It is worthy of note that in the Scotch Symphony Mendelssohn employed the A clarinet for its fulness of tone, although the music was in A-minor, forcing him to write the part with three flats, in C-minor. A C clarinet part could have been

written without any flats, but the richness of tone would have been lost.

The French composers were not backward in using the clarinet, and Boieldieu wrote a graceful solo for it in his opera "Jean de Paris." Meyerbeer employed it frequently, although his friendship with M. Sax, the instrument maker, led him at times to write for the latter's bass clarinet instead of the smaller form. A description of clarinet music would be incomplete without the names of Spohr and Rossini also. Spohr wrote for it two concertos of great difficulty, and often used it in accompaniment for the voice. Rossini gave it some exquisite phrases in his "Stabat Mater," but his overtures to "Semiramide," "Otello," "La Gazza Ladra," and other operas abound in passages that are fiercely difficult as well as brilliant. Wagner, Tschaikowsky, and more modern writers have used the clarinet profusely. Its tone blends excellently with that of all other instruments, and it may well be given the leading position in the wood-wind.

In addition to the three clarinets already described, there are several others in existence. Mozart, in his opera "Idomeneo," has twice called for clarinets in B-natural, which are en-

tirely unused now, the parts being rewritten for the A clarinet. The B-natural form would of course transpose down a semitone, and therefore would have its music written a semitone higher than the desired sound. It would also be of use in playing in keys with many sharps.[1]

Clarinets which transpose upward exist in the keys of D, E-flat, F, and A-flat. The music for these instruments must of course be written lower than the actual sound required. The

[1] Orchestral keys are by no means a matter of mere preference, for while the pianist may play in any key or scale-fingering that he chooses, the orchestral players on nearly every instrument find certain keys a great deal harder than others. The best for orchestral usage are C, G, F, or B-flat, or their relative minors, and nearly every great composer keeps fairly close to these. The keys of Beethoven's nine symphonies, for example, are C, D, E-flat, B-flat, C minor, F, A, F, and D minor, none of them having more than three sharps or flats. The aria "Hear ye, Israel," in Mendelssohn's "Elijah," starts in B minor, but modulates into the difficult key of B major. This is not without its reason, however, for it is said that Mendelssohn chose it so as to bring out the strong high F-sharp in the voice of Jenny Lind, whom he wished to sing the piece. Wagner held the theory that a composer might modulate freely and disregard key in the production of his harmonies. "Swimming in a sea of tone," he called it. But even while taking this liberty he wrote with consummate care and skill. Orchestral playing has today reached a higher standard of excellence than ever before, but it has its limitations even now. Liszt's Hungarian Rhapsodies, for instance, while in various keys for piano, are often transposed when arranged for orchestra, to make the performance less difficult.

clarinet in D is found in the second act of Cherubini's "Lodoiska," and Wagner has used it in the final scenes of "Tannhäuser" and "Die Walküre." It is often employed in modern German dance music, such as that of Strauss. The E-flat clarinet, too shrill for orchestral purposes, forms a part of military bands. Berlioz, with his usual fondness for bold experiments, used it, with appropriate effect, however, in the *finale* of his Symphonie Fantastique, where the young lover who murdered his sweetheart through jealousy is not allowed to rest in peace after his execution, but is represented in the final movement as enduring the pangs of the infernal regions. The clarinet here shares with the piccolo the task of representing deviltry in music. Clarinets in F were formerly employed in the regimental bands of Germany, and some of Beethoven's marches, as well as Mendelssohn's Overture, Op. 24, for a military band, contain parts for these instruments. The A-flat clarinet, the most squealing instrument in the world, appears only in the Austrian bands.

Tenor clarinets exist, which transpose a fifth and a sixth downward, but the first of these is practically the same as the basset horn. The

basset horn therefore bears the same relation to the C clarinet that the English horn does to the oboe, sounding a fifth below. The basset horn differs from the deep clarinet in F in having a little brass bell at its lower end, and in possessing four semitones below the natural scale of the clarinet family. Its fingering thus allows its compass to begin at the C below middle C, the actual sound produced being the F below that. From that note it extends upward for three and a half octaves. The notation is in the G and F clefs. Its music is written a fifth above the notes actually wanted, but a century ago it was customary to write those on the bass staff an octave too low, so that the instrument would transpose up a fourth instead of down a fifth.

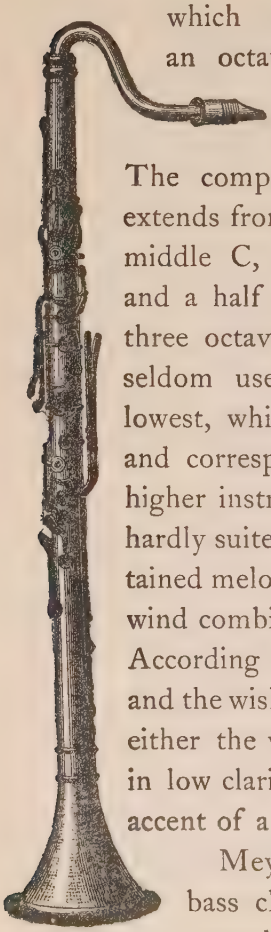
THE BASSET HORN

The tone of the basset horn is much like that of the clarinet, but less brilliant in quality. It has a rich, sombre colour, well suited to music

of a religious, or even funereal character. Few of the great masters have demanded the instrument, in spite of its worth. Beethoven employed it effectively in his "Prometheus" overture, while Mendelssohn used it for military band music and wrote two pieces for clarinet and basset horn with piano. Mozart seems to have had the fullest understanding of its capabilities. In his Requiem the only reed instruments used are two basset horns and two bassoons, which give an appropriate effect of subdued colouring. In the temple scene of the "Magic Flute," he introduced basset horns for the same purpose. They are found in many of his works, and in "La Clemenza di Tito" is an elaborate obbligato part for the instrument. The basset horn is now practically obsolete.

The bass clarinet is a still deeper-toned member of this family. It has the same key system as the ordinary clarinet, but has a crook for the mouthpiece and a large bell at the lower end. Its tones are an octave lower than those of the smaller instrument. The usual form is set in the key of B-flat, an octave below the B-flat clarinet. Its music is written in C, the instrument transposing downward a major ninth.

Wagner has written for a bass clarinet in A, a semitone below this, while a form in C exists, which transposes downward only an octave.



BASS CLARINET

The part of the bass clarinet is written in the G clef. The compass of the B-flat instrument extends from D, nearly two octaves below middle C, upward to the F an octave and a half above it. This includes over three octaves, but the highest notes are seldom used. The best register is the lowest, which is rich and full in tone, and corresponds to the chalumeau of the higher instruments. The bass clarinet is hardly suited for rapid passages, but in sustained melody, or long bass notes in wood-wind combinations, it is excellent in effect. According to the character of its music, and the wishes of its performer, it may give either the weird, mysterious quality usual in low clarinet tones, or the deep, solemn accent of an organ pipe.

Meyerbeer was the first to use the bass clarinet, giving it an eloquent monologue in the fifth act of "Les

Huguenots," where Raoul and Valentine are finally married by Marcel, only to fall victims to the soldiers in the massacre of Saint Bartholomew. Meyerbeer employs it also in the coronation march of "Le Prophète," where it takes the melody. Wagner has written especially well for it, and has made it a part of his orchestra in the Trilogy. He first introduced the modern custom of placing the notes on the bass staff, where they would sound as written for the C instrument. Later composers call for it frequently. In recent years a still deeper clarinet has been made by M. Besson, of Paris, who gave it the name of pedal clarinet. This instrument is of extremely low compass, being able to produce the so-called contra D, the lowest D on the pianoforte.

Just as the double reed mouthpiece has been used in combination with a metal tube, so the clarinet reed has been adapted to a brass instrument. This instrument is known as the saxophone, from the name of its inventor, Adolph Sax. It was first brought out by him about 1840. There are several forms of the instrument, resembling the clarinets very closely in shape, and being provided with the usual keys. The tube

of the saxophone is conical, however, so it is enabled to produce all the harmonics, in spite of the large size of its reed. In fingering, therefore, it resembles the oboe rather than the clarinet. Its tone-colour is rich enough, though rather difficult to explain. M. Gevaert gives an enthusiastic description of it as "a voice rich and penetrating, the rather veiled quality of which partakes at once of the 'cello, the English horn, and the clarinet, with more fulness of tone."

There are in all twelve varieties, divided into the six classes of sopranino, soprano, alto, tenor, baritone, and bass, each class containing two saxophones. The written compass runs from B below middle C to E-flat over two octaves above it. All the instruments but one are transposing, however, the two first raising a C to F and E-flat, the third sounding as written, the fourth lowering C to B-flat, while the rest lower the tone in succession to F, E-flat, C, B-flat, and the same notes repeated in a lower octave. Thus the B-flat bass saxophone transposes down over two octaves. All these instruments play an important part in the French military bands, but

are seldom called for in the orchestra. Bizet, however, has written a pleasing melody for the alto saxophone in E-flat, in his ever delightful "Arlésienne" music.

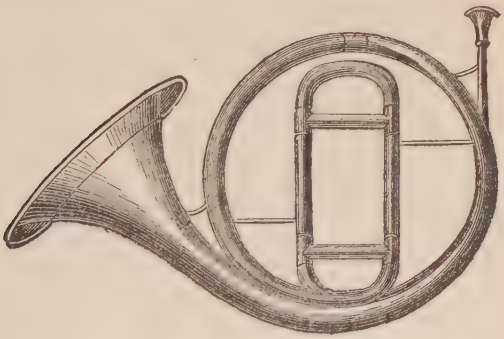
CHAPTER IX.

HORNS, TRUMPETS, AND CORNETS

THE wind-instruments already described depend for their tones upon the vibration of the air itself, or of a single or double reed. The remaining group of wind-instruments, forming the brass section of the orchestra, derive their tones from the vibrations of the players' lips, which are pressed more or less strongly against a round, usually cup-like, mouthpiece. There is another important difference between the brasses and the wood-wind. While the flute, oboe, and clarinet use only a few notes of the harmonic series, and obtain intermediate tones from either the fundamental or the simpler overtones, the brass instruments possess the power to give a large number of these partial tones, and in the natural instruments can derive no other clear notes from them. Still another difference lies in the fact that while in the wood-wind the air-column is shortened to

alter the pitch, the tube is invariably lengthened in those brass instruments where such a change can be made.

The natural horn, sometimes called the Waldhorn, is the simplest of all instruments, consisting merely of a tube. Horns have been known from earliest times, and every savage tribe that is



NATURAL HORN

at all musical will possess some form of horn, made of bone, ivory, or even wood. Among the Greeks and Romans, the chief use of horns and trumpets was for military purposes. Mediæval Europe possessed an instrument of the wooden type, called the cornetto, but from the fact that it was pierced with holes like other wood-wind instruments, it is often spoken of as an old oboe.

It has also been described as resembling the bugle.

The mediæval use of the horn was to give hunting signals. In this function it was the successor of the cornetto. The older form, seen in pictures of the time of Louis XI. and Charles IX., was bent in a single curve, and could have given but few tones. In the time of Louis XIII., however, the shape was more complex, and we find him able to invent a special hunting-call of several notes to signify the fox. Gradually the hunting-horn came to consist of three large circles, so that it could be hung obliquely around the body, resting on one shoulder. Thus its shape differed but slightly from that of the present orchestral horn.

It was Louis XV., with his master of the hunt, who first systematised the horn-calls. These were divided into three general classes: Simple calls, to cheer the hounds, ask for aid, or explain the various circumstances of the hunt; fanfares, one for each animal, and several to indicate the age, size, and shape of antlers of the stag; and more elaborate airs, performed after the hunt in token of success or pleasure. These airs were many in number, and formed the link between

the use of the horn as an accessory to hunting and as a musical instrument.

The introduction of the horn (often called the French horn) into the Paris orchestra is said to have been due to the composer Gossec. When the singer Sophie Arnould, afterward so famous in Gluck's operas, made her Parisian début, in 1757, the young Gossec composed two arias for her, in which he wrote obbligato parts for two horns and two clarinets. Scarlatti made the instrument familiar to Italian audiences at this time, but it must have been used before this in Germany, for it appears frequently in Bach's scores, and was used by Handel as early as 1720, in his "Radamisto."

Strange to say, the horn was received with great opposition at first. It was called coarse and vulgar, a rude instrument of the chase, unfit to mingle with the more refined violins and oboes. Time has reversed this verdict, and the smooth, velvety tone of the horns is to-day one of the most prized colours in the orchestra.

The natural horn, without keys or valves, is a conical brass tube, curved upon itself, provided with a tapering mouthpiece at its smaller end, and a large bell, or expanded opening, at

its other extremity. The player's lips vibrate against the mouthpiece, at a speed governed by the length of the tube, the pressure of his breath, and the firmness which he uses in making his "embouchure." Firm lips and hard blowing produce the higher harmonics. The narrowness of the tube is another aid in the formation of these upper notes. The fundamental, or full-length tone of the horn is never sounded, but all of the harmonic series, even up to the twentieth, are possible. Referring to the table of harmonics given in connection with the violin, the reader will readily see that in the higher octaves almost a complete scale is formed. If a tube eight feet in length is taken, the lowest tone according to theory would be C two octaves below middle C, while the lowest actual tone is the C only one octave below. The remaining tones would be as follows, in ascending order: G, C (middle), E, G, B-flat (too low),[1] C, D, E, F-sharp (too low), G, A (too low), B-flat (too low), B, C, D-flat, D, E-flat, and E. The series in actual use ends with the last C.

The lack of intermediate notes in the lower octave makes it impossible for the performer to

[1] The tones marked "too low" are somewhat flat of our scale.

wander far from the natural key of his instrument. To aid him in modulating, there is a set of crooks of various sizes provided with each instrument, and by inserting one of these in its proper place, he can lengthen the tube so that the fundamental note is altered and a new harmonic series given. The horn possessing the tones given above is the one known as the C-alto, now little used. Music for it would be written in the G clef, and would sound as written. All the horns now employed transpose downward, the notation and the consequent strength of blowing being the same for a given harmonic on each horn, while the length of the instrument determines the actual pitch of the note. Horns exist in B-flat alto, A, A-flat, G, F, E, E-flat, D, C, and B-flat basso. These transpose downward by intervals varying from a major second to a major ninth, while their music is written in C, at the same interval *above* the sound desired. The intermediate keys may be obtained by drawing out a slide in the tube, thus altering the size of the instrument enough to lower it by a semitone. The total length of tube increases from nine feet on the highest horn to eighteen on the lowest.

The compass of the horn varies according to the length of its tube. As longer tubes give more overtones, it follows that the deeper horns have the most extensive compass. Their low notes, on the contrary, do not sound so well as the low tones of the shorter horns. Extreme intervals are not easy on the horn, as they require an abrupt change in the pressure of blowing. Long passages in high notes are fatiguing, owing to the continual high pressure of lip required. Trills are practicable only in the upper scales. Many composers obtain greater freedom in writing by using horns of several sizes in one composition. Meyerbeer and Berlioz have shown especial fondness for this procedure, calling for as many as four different keys at times.

The natural, or open, tones of the horn are not the only ones it can give, but they are by all odds the best. On the F, E, and E-flat horns especially they have a full richness and depth of colour. Composers of the classical period used these horns with telling effect, and their romantic beauty lends its charm to many famous works of that great epoch. The wonderful horn passage in the scherzo of Beethoven's Eroica Symphony

CARL MARIA VON WEBER

seems imbued with unfading glory. So, too, do the horn-calls in the finale of Schubert's C-major symphony, — soft at first, like the "Horns of elf-land, faintly blowing," then gradually swelling into the richest of harmonies. Weber, too, loved the horn, and it fitted well in the scores of his operas. The noble horn quartet of "Der Freischütz" is almost too well known to need description. Rossini, himself the son of a horn player, used the instrument freely; but his melodies lack the older and simpler style, being of the brilliant and florid character that is best suited to the valve-horn. His Stabat Mater contains a part for a horn in A-flat basso. Mendelssohn, last of the classicists if Brahms be excepted, introduced some beautiful horn passages into his works, a notable one being found in the third movement of his Italian Symphony. Modern composers are no less devoted to the instrument. Wagner, in his impressive "Ride of the Valkyries," demands as many as eight horns.

The open tones on the natural horn may be altered considerably. By relaxing the lips and inserting his hand in the bell, a good player can lower the first tone of the horn by several notes, which are designated as artificial or factitious.

The upper harmonics also may be lowered by the same action of the hand, giving notes which are then known as stopped or muted.[1] The performer may vary their quality considerably by altering the position of his hand, and composers sometimes indicate, by the figures ½, ¾, and so on, how much of the bell is to be covered. The stopped tone is soft and veiled in character, but by the special blowing needed to produce a blaring, "brassy" quality, it may be made into one of the ugliest sounds of the orchestra. This colour is much used now, especially by those composers who are no longer able to attain beauty by simple means, but struggle after overpowering effects.

This discordant quality can be produced in the open notes, by detaching the bell from the instrument. Such a result is obtained in the climax of the duet, "Gardez-vous de la jalousie," in Méhul's "Euphrosyne et Coradin." Grétry, when asked what he thought of this wild duet, replied that it was enough to take the roof off the theatre and the skulls off the heads of the audience; but Grétry went to the other extreme in his own

[1] The sixth harmonic, B-flat on the C horn, is too flat for our scale, but it may thus be changed into a good A.

music, and gave only melodies that sound shallow and tinkling to-day.[1]

Schumann once made an unintentional demand for muted horns. Especially devoted to the piano, he was never thoroughly at ease in handling the orchestra, and when he wrote the opening phrase for his delightful Spring Symphony, the one in B-flat, he gave the passage to horns and trumpets, and through ignorance included among their soft notes one of the ugly stopped tones. At the rehearsal the performers were ready to laugh at the odd effect, but he saved himself skilfully by saying that he had meant to write the passage a minor third higher; and a minor third higher it remains, even to-day.

Owing to their repulsive quality, the muted horn tones are eminently fitted to picture evil. Gounod uses them in "Faust," where the aged and despairing philosopher is asked to sign the

[1] When Grétry was asked why he did not modulate more frequently in his works, he replied, "I may do so sometime, but I must have good cause for it." "What do you consider good cause?" queried his companion. Grétry then responded, "Suppose that in the plot of an opera an amorous youth should attempt to make love to a fair maiden against her father's wishes, — if the father should come upon them unexpectedly, and administer a hearty kick to the young man, I should then modulate very abruptly."

contract giving his soul to the devil. Wagner, too, employs them often, and when the hero Siegfried meets his fate, in the second act of "Die Götterdämmerung," their baleful tones sound forth with powerful effect. Massenet has used them skilfully for a totally different purpose, — that of representing the cracked old

VALVE HORN

village bell, in the "Angelus" of his Scènes Pittoresques. The employment of the open tones by Berlioz, in combination with the harp, has already been noted, and produces an excellent imitation of a full-toned bell.

The valve horn now usually replaces the older form, and gives tones which are almost as good in quality. The complications introduced into

the tube, however, are not without influence in lessening their fulness and richness. The valve horn differs from its predecessor in being provided with valves, or ventils, which enable the performer to alter the length of tube at any instant by pressing with his fingers. The first valve throws enough extra tubing into use to lower the pitch a tone, the second a semitone, and the third a minor third. The first two valves played together give about the same result as the third alone, and while they are less accurate in length when taken together, they are much used in actual performance, because the third valve is played upon by a weaker finger. The second and third together will lower the pitch four semitones, or a major third, the first and third valve depress the note five semitones, or a perfect fourth, while all three lower it six semitones. The largest interval between any successive open tones on the horn comes between the first and second. As the valves can lower the second tone to within a semitone of the first, the horn is thus put in possession of a complete chromatic scale. Each of the single notes obtained by the use of the valves, in altering the lowest tone, has also its own series of harmonics,

so that it becomes possible to produce high notes in several different ways.

Although all keys are possible on the valve horn, it is still best for the composer to write for the instrument in as vocal and diatonic a manner as possible. The performer generally sets his horn for the key of F, and uses no other crook, except on unusual occasions. The range of stopped tones is increased also, for the player can now produce them all by sounding the semitone above them and inserting his hand in the bell as usual. Modulation, of course, presents absolutely no difficulties on the valve horn, and the continual use of the horn in the most modern scores gives evidence of this fact.

The post-horn, a simple tube four feet or more in length, has been used by Beethoven and Mozart. Its tones are full and clear, as a straight tube always produces better results than one with many curves in it. The post-horn is usually in the key of C or B-flat, and gives only the first five harmonics, corresponding to those of the bugle.

The trumpet is one of the oldest of instruments. China ascribes the greatest antiquity to it. Egyptian art proves its existence in that

ancient country. The Hebrew prophets were familiar with it, and held it responsible for the fall of the walls of Jericho. Greece possessed it even in the time of the Trojan war. Rome adopted it at an early date, the lituus, or curved trumpet, coming from Oscan models, while the tuba was borrowed from the Etruscans.

Trumpets were constantly in use during the middle ages, especially in the period when chivalry flourished. Owing to the employment of the instrument by heralds on great occasions, it became a favourite with the aristocracy, and an adjunct of royalty. As late as the time of Henry VIII. of England, we find a royal orchestra consisting of ten trumpets balanced against only nine stringed instruments. The wide popularity of the trumpet led to the formation of a trumpeters' guild, or society, which contained members of the highest rank and grew to be one of the most important of the old musical unions. It gave an impetus to the playing of the instrument, as well, and kept up the standard of excellence in execution. This guild existed down to the beginning of the nineteenth century, and even then contained several distinguished members. One of

GERMAN TRUMPETER, SIXTEENTH CENTURY

the best known was the Duke of Saxe-Weimar, who had to apply in regular form, and pass an examination in trumpet playing, with as much

red tape as in the case of any unknown and obscure aspirant for the honour.

The trumpet differs from the horn by having a tube that is cylindrical instead of conical, except for the bell at the end. In shape it resembles a rectangle rather than a circle. Its mouthpiece, too, is a shallow hemispherical cup, and not a tapering cone. This difference in the shape of the mouthpiece is of great importance in giving the trumpet tones their martial quality. The tube of the trumpet is just half the length of that of the horn, and in consequence its tones sound an octave higher.

NATURAL TRUMPET

The trumpet in C is eight feet long, half the size of the horn in low C. Its music is written in the G clef, and sounds as written. From the tables and illustrations already given, the reader will understand that the air-column does not vibrate as a whole, in which case it would sound the C two octaves below middle C,

but subdivides into halves, thirds, quarters, and so forth, giving the higher notes of the harmonic series with the shorter divisions of the column. This series of partial tones begins an octave below middle C, and is the same as that of the unused eight-foot horn in C-alto. The real trumpet quality, however, begins with the second harmonic.

As with the horn, crooks of different lengths may be inserted into the natural trumpet, to alter its pitch and set it in a new key. All the trumpets, except the one in C, are transposing, the music being always written as if for the C trumpet. The keys obtained by the use of these crooks are F, E, E-flat, and D transposing upward, C sounding as written, and B-flat lowering the pitch a tone. A few other trumpets are to be found occasionally. Thus Auber has called for a trumpet in G, sounding a perfect fifth higher than written, Schumann has demanded one in B, a semitone lower than written, and Schubert, in his seventh symphony, employs one in A, depressing the pitch a minor third. The higher toned trumpets are the most brilliant in quality. The compass extends up to the fifteenth harmonic, three octaves above the first, but in

practice it seldom goes above the eleventh, which for the C trumpet would be G, an octave and a half above middle C.

As early as the time of Monteverde the trumpets in the orchestra were divided, consisting of one *clarino*, or small instrument (whence the name "clarion"), and three larger ones known as *trombe*. This distinction was kept up, until in the time of Bach and Handel we find the trumpeters divided into two separate classes. The "Clarinbläser" took the upper notes, and by the use of a special mouthpiece, aided by long practice, they were able to perform the most florid and brilliant passages. The rapid melodies so frequently found in old scores were played by these *virtuosi*, while the bass parts were taken by the so-called "Principalbläser," who were rarely required to go above the seventh harmonic.

The gradual disappearance of the specialised "Clarinbläser," and possibly also the decline of the trumpeters' guild, brought about a decadence in the playing of the trumpet. During the classical period, when almost every instrument was being given new and varied employment in the orchestra, the trumpets were relegated to an inferior position. Mozart used them but little,

and substituted his beloved clarinets for many of the difficult trumpet parts in Handel's "Messiah." This may have been partly a matter of personal taste, however, for Mozart disliked the trumpet, and until the age of ten could not bear even to hear its tone. Beethoven employed the trumpets very sparingly, and when he did call for them it was usually in passages for full orchestra. Weber, too, wrote little for them, in spite of his admiration for the softer-toned horns.

The tone-colour of the trumpet is extremely brilliant, and well suited to express martial glory. It is so powerful that a single one of its notes can be perceived readily in passages for full orchestra. It can be softened considerably, but is best in clear, ringing tones, which are altogether noble in effect. Its stopped tones are not often used, but the instrument is provided with a mute, or sordino. This resembles the mute sometimes applied to the horn, and is a conical or pear-shaped mass of leather or papier-mâché. Wagner has used muted trumpets in "Die Meistersinger," where their bizarre effect when strongly blown gives an excellent imitation of the tiny trumpet of the toy-makers, and precedes the entrance of their guild.

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The open notes of the trumpet are heard at their best in fanfares. Wagner has been especially happy in his use of them, for they are well suited to the mediæval subjects of many of his operas. A good example is found in "Lohengrin," where the trumpet-calls of the castle warders echo to and fro as the morning dawns. In "Tannhäuser," at the entrance of the minstrel knights into the hall of song where they are to compete, the trumpets play an important part. All through "Die Meistersinger," too, they have much to say. Whenever these trumpets appear on the stage, they are the natural instruments. An impressive trumpet fanfare is heard in Verdi's great Mazzoni Requiem, where the composer has undertaken to suggest the last trump at the Day of Judgment.

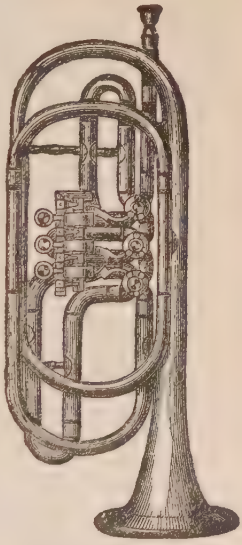
Duets between voice and trumpet have long afforded a favourite method for displaying the instrument. The greatest of these is undoubtedly the attractive bass solo, "The trumpet shall sound," in Handel's "Messiah." The aria, "Let the bright seraphim," is another instance, this time for soprano. It is not always the trumpet that wins in these trials of strength. The great basso Lablache, for example, had a

voice that could dominate the entire orchestra. The famous tenor Farinelli, appearing once at Rome in conjunction with a trumpeter, wholly excelled his rival in brilliancy, force, and wealth of ornamentation; and to make the triumph complete, the singer continued after his opponent was exhausted, actually increasing the power and breadth of his tones. A similar anecdote is told of Mrs. Billington, the well-known English singer, and on one occasion conductor and trumpeter nearly came to blows because the latter could not play with enough strength to balance the voice part.

Thomas Harper, the great English trumpeter of the last century, used an instrument provided with a small slide. This consisted of a double joint in the tube, so that it could be elongated slightly in trombone fashion. The slide differed from that of the trombone, however, in being drawn toward the player instead of away from him. The slide was of use in correcting those harmonics that are out of pitch with our scale (notably the sixth and tenth), and also in increasing the number of tones possible on the instrument. It could lower any note by either a semitone or a whole tone, and while this did not

complete the chromatic scale in all parts of the compass, it added greatly to the trumpet's musical worth.

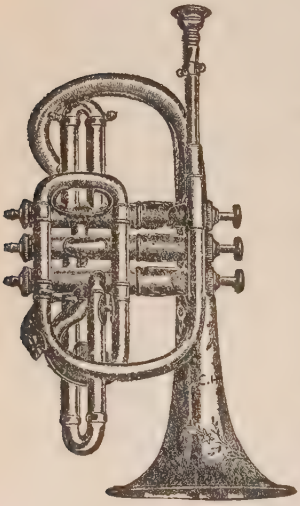
Much more commonly used than the slide trumpet is the valve trumpet. This is provided with valves exactly similar in principle to those of the horn, and it is thus enabled to give a complete chromatic scale in either open or stopped tones. As with the horn, however, this instrument sounds best in passages where the open tones predominate. On the valve trumpet the florid Handelian passages become perfectly practicable, and Mozart's rescoring of them with clarinets is no longer necessary.



KEYED OR VALVE TRUMPET

An instrument of the valve type is the bass trumpet called for by Wagner in his Trilogy. This sounds an octave lower than the usual form, and is therefore in unison with the horns. Its tone has not the nobility of the higher trumpets, but resembles the sound of a rather poor trombone.

The cornet, or cornet-à-pistons, is a conical brass tube about four and a half feet long, with a wide bore in proportion to its length. The cornet plays naturally in the key of B-flat, although it is provided with crooks by which it can be set in A, A-flat, or G. It is a transposing instrument, and must be written above the required key, as it transposes downwards. While the horn and trumpet are always written in C,[1] the cornet may have sharps or flats in its signature as required, therein resembling the clarinets.



CORNET

The small size of the cornet makes it sound an octave above the B-flat trumpet. Thus a given scale on the cornet includes fewer harmonics, and consequently needs

[1] Modern composers no longer cling to the C-signature in the horn part, but sometimes choose any desired size of instrument, usually the F horn, and use whatever sharps or flats are needed to make it transpose into the required key.

fewer alterations in the strength of blowing, than the same scale on the trumpet. This accounts for the fluency of the former instrument, which is capable of more varied execution than any other member of the brasses. Rapid passages, trills, repeated notes, double tonguing, and all sorts of embellishments are practicable, and the wide use of the cornet in popular concerts illustrates this fact.

The tone-colour of the cornet is not to be compared with that of the trumpet. Except in the hands of a skilled player, it becomes coarse and blatant in quality. It is so much easier to play than the trumpet that many small orchestras admit it to their ranks as a substitute for the latter, but no great conductor will tolerate it.[1] It has sometimes been used by composers, mostly in France, but only where its own special effect is desired. The quality of its tone is partly due to its mouthpiece, which is cup-shaped, and deeper than that of the trumpet. Sometimes trumpet players effect a compromise between the two instruments by using a cornet mouthpiece on a trumpet tube. Berlioz claimed that a combina-

[1] Yet in America the cornet is found replacing the trumpet in all orchestras except two or three of the largest ones.

tion of cornets and trumpets produced a distinctive colour of its own, but most modern writers seem to have banished the cornet entirely from the orchestra.

CHAPTER X.

TROMBONES AND TUBAS

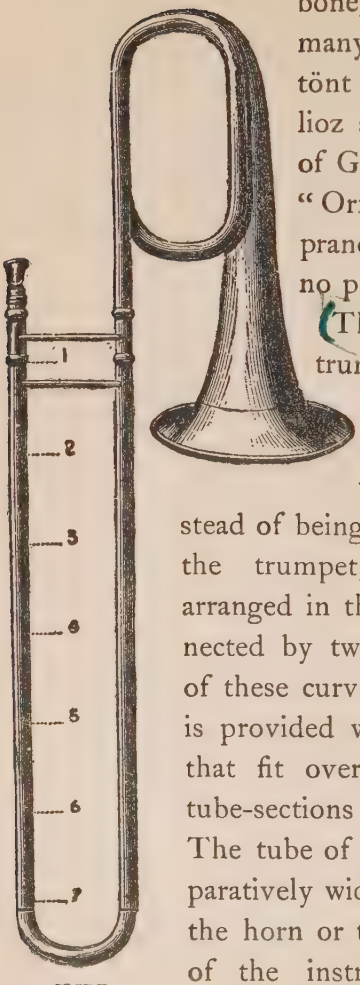
In the classical orchestra, where the instruments were divided into three definite groups, the string and wood-wind divisions existed as quartets. The string band, however, could play its concerted passages without the contrabass, and by the use of first and second violins gave four-part harmony with three instruments instead of four. The case is similar with the brasses, and composers formerly had to make their harmony with only three instruments, horns, trumpets, and trombones, and sometimes with only two, if the trombones were omitted. In more modern times, the introduction of the tuba has completed the brass quartet, but as these instruments vary in their effects, they are not used in such definitely prescribed parts as those of the strings. Often the horns form a quartet by themselves, the trumpets are treated separately, and three trombones and a bass tuba make up another quartet.

Although the trombone was not admitted to the orchestra until the nineteenth century, it is one of the oldest of instruments. Its name, in Italian, signifies a large trumpet, exactly as the old violone meant a large viola. The old English name of the instrument was the sackbut, which has been derived from the Spanish or Moorish term *sacabuche*, signifying a pump. This derivation is eminently descriptive of the slide trombone, which is played by drawing in and out a sliding joint, with a motion not unlike that of pumping.

There seems now no reason to doubt that this slide was a contrivance of extremely ancient times, antedating by many centuries the use of crooks or valves. Its invention is claimed for Tyrtæus, in the early date of 685 B. C., while it is sometimes ascribed to the mythical Osiris. The slide cannot be definitely found in the ancient paintings and sculptures, but there are several accounts of the unearthing of a trombone at Pompeii, in the year 1738. One author describes it as a bronze instrument with gold mouthpiece, and adds that the King of Naples gave it to George III. of England, who happened to be present at the discovery. A later writer mentions the in-

strument as being in the royal collection at Windsor Castle, but it cannot now be found, so the entire story is doubted. Arcadius, writing on Greek accents in A. D. 200, draws a simile from certain contrivances which could make the *aulos* extend up and down as well as backwards and forwards, — evidently some sort of a slide. Mersenne attributes to Apuleius an old Latin passage, which says that when the channels (canales) of the tuba (trumpet) are drawn in or out by the right hand, musical sounds may be produced from the instrument.

By the end of the middle ages, trombones were familiarly known, especially in Germany. In 1520 there existed a well-known *Posaunenmacher*, Hans Menschel, who made instruments at least as good as the trombones of to-day. A century later, Michael Prætorius, in his "Theatrum Instrumentorum," gave excellent figures of trombones corresponding to the alto, tenor, bass, and contrabass forms known at present. The works of Bach, as might be expected, abound in passages for trombones of every kind, even including a small soprano form. It is worthy of note that Handel's aria, "The trumpet shall sound," was formerly given to a small alto trom-



SLIDE TROMBONE

bone, and known in Germany by the words, "Es tönt die Posaune." Berlioz says that the cornetto of Gluck's Italian score of "Orfeo" was really a soprano trombone, but offers no proof.

The trombone, like the trumpet, is a long brass tube, cylindrical except for the bell and the mouthpiece. Instead of being bent upon itself, like the trumpet, the trombone is arranged in three parallel lines connected by two short curves. One of these curves forms the slide, and is provided with two tubular arms that fit over two of the parallel tube-sections of the instrument. The tube of the trombone is comparatively wider than that of either the horn or trumpet, and the tones of the instrument are therefore richer and fuller, though less bril-

liant. The upper notes of the harmonic series are rendered difficult, but in compensation the pedal tones, in which the air column vibrates as a whole, can often be produced.

The trombone usually found in orchestras is the tenor instrument, and with the slide closed it is about nine feet long, giving as its fundamental note (pedal tone) the B-flat over two octaves below middle C. Its first harmonic is an octave higher, corresponding to that of the B-flat alto horn. But while the horn compass includes many high harmonics, that of the trombone consists of but few. The actual notes in the latter case are F and B-flat just below middle C, and the D, F, A-flat and B-flat just above it. By referring to the table on page 66, the reader will see that the A-flat, formed by vibrating segments one-seventh of the total length of the tube, is slightly out of pitch with our scale. The C and D above this are sometimes used by solo players, but they are too difficult for ordinary orchestral use.

When the slide is closed, it is said to be in its first position. As it is drawn out, it lengthens the tube, thus lowering the tone. There are in all seven positions, each successive one lowering

the pitch by a semitone, the entire elongation making possible a total alteration of six semitones, or an augmented fourth. Thus a B-flat may be lowered into an E, and an F into a B. This gives the trombone a complete chromatic scale throughout all its compass except the octave between its pedal tones and the first harmonic. Here there is a gap of five semitones, as the highest pedal tone is B-flat, and the B-flat above it can be lowered by the slide only as far as E. M. Sax, the instrument maker of Paris, again came to the rescue, and invented a trombone provided with a piston for the performer's left thumb, which enabled him to fill the tonal gap. But this contrivance is not much used, even to-day.

The pedal tones of the trombone are some of its most valuable notes. They are of indifferent quality on the alto form, but much prized on all the lower instruments. They are difficult to produce, and on the tenor trombone there are but four, descending from the lowest B-flat by semitones as the slide is drawn out. These four, however, differ from the upper tones in being more gruff and ponderous in quality, and well repay the practice needed for the performer to master them. They cannot always be produced

upon the bass trombone, but when they are obtained they are almost overpowering in their fierceness.

The use of the slide renders the trombone more perfect in tone than any of the instruments except the violin family. Not only can the slide be used in correcting those harmonics that are out of tune with our scale, but it also enables the performer to produce varied effects by sharping or flatting his tones at will, as the violinist does also in certain progressions. Trills are practicable on all the upper notes of the instrument, though they are not effective on the bass trombone. Rapid passages are unsuited to its character, and are usually difficult, except for those few phrases that lie entirely in one harmonic series and can be blown without change of position. Such quick execution is never demanded in orchestral works, though allowable in solo pieces. A trombone concerto by Ferdinand David, for instance, abounds in florid passages. In these the performer picks out the easiest way of reaching the desired result, as in many cases he can produce a given tone either by altering the pressure of blowing or by changing the position of the slide.

Of the various sizes of the trombone, the soprano, or smallest, has now disappeared from the musical world. It stood in the key of B-flat, with its first harmonic a tone below middle C in pitch. It is found in several of Bach's cantatas, and in the "Kyrie" of Mozart's unfinished Mass in C minor, but not in any later works. It was often used to double the soprano voice, — in fact all the trombones seem to have been employed for a similar purpose, forming an instrumental group to play in unison with the vocal quartet. The pedal notes of the soprano trombone, like those of the alto, were not usually called for.

The alto trombone stands in F; that is to say, its fundamental tone is F, and its harmonic series with closed slides is based on that note. Its lower register is inferior in quality, and as it corresponds to the best part of the tenor trombone, it is never needed. But its upper notes are superior to the same tones on any other instrument of this family, and they might well be included in some of our extensive modern orchestras.

The tenor trombone is the instrument most usually adopted to-day. Its compass has been given already. The orchestras of the present

generally contain three trombones, and in nine cases out of ten these are all tenor trombones. Because there are often three separate parts for them, they are sometimes given different names, but this proceeding is always misleading. There is no instrument in the entire orchestra which has been written for in more different ways than the trombone. In the old days each instrument received its special staff and was notated in the clef pertaining to its name. In modern times the trombone parts usually cover two staffs, with alto or tenor clef for the upper and bass for the lower. In such a case the ophicleide or tuba usually goes with the bass trombone. Still another method in use places all these instruments on the same staff, with the bass clef. None of the trombones are transposing instruments, all being written exactly as they sound.

The bass trombone is made in several different sizes. That in G, a minor third below the tenor instrument, is the highest in pitch. Other forms are met with in F and in E-flat, a fourth and fifth below the usual B-flat form. The bass trombone is only needed in producing extremely low tones, beyond the reach of the higher instruments. It causes great fatigue on

the part of the player, and makes inordinate demands upon his lungs. The composer, therefore, should call for only a few of its notes at a time, and give frequent rests. Wagner, in his Bayreuth orchestra, included a contrabass trombone, even more difficult to play and more stupefying in its effect. The key of this instrument is B-flat, an octave below that of the tenor trombone. Its pedal tones are of course impossible, but with the use of the slide it can reach the pitch of the lowest E on the pianoforte, and it gives this tonal grunt in the opera of "Siegfried."

The trombone is the chief of those wind instruments that depict heroic emotions. It possesses in a superlative degree the qualities of nobility and grandeur. Its deep and powerful tones speak in the most poetic accents, and may reflect anything from sacred religious calm to the liveliest acclamations of martial glory. It is especially effective in sombre passages, and has a forbidding, almost threatening quality of tone. Its loud tones are unusually menacing, and Gluck has used them skilfully in this vein, in the Chorus of Furies in Act II. of "Iphigenie en Tauride." Still more admirable is their wrathful

chord in answer to Alceste's defiance of the gods of death, in another of his works.

Mozart understood well the use of the trombone. It adds its rich colour to the priests' services in the "Magic Flute," and is given some impressive chords at the beginning of the great Requiem. More famous than these are the weird, unearthly effects obtained by the trombone in "Don Giovanni." When the statue of the murdered Don Pedro actually speaks in response to that ribald nobleman's mock invitation to supper, the trombones are heard in chords of menace and solemn warning.

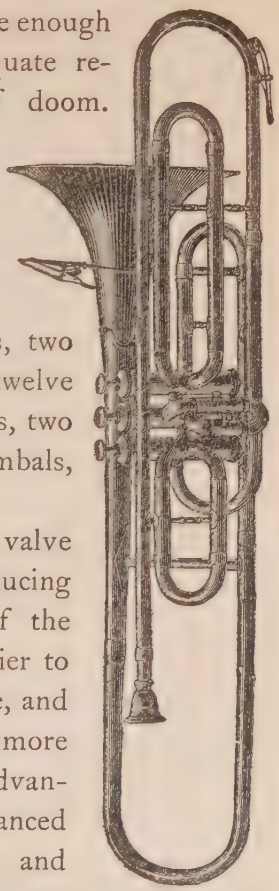
Beethoven was familiar with the instrument, but it did not appear in his earlier works. In the fifth symphony it entered the symphonic orchestra for the first time. Although it occurred in the sixth and ninth also, it did not have any important work assigned to it. As late as 1823, it is said, Beethoven eagerly seized upon a visiting trombone-player, and made lively inquiries about the use of the instrument in high passages. That he obtained full knowledge of all its possibilities is shown, not only by the finale of the ninth symphony, but by a letter that he wrote a few years later. In this letter he

had occasion to send a complaint to his publisher Schott, and after some lines of playful abuse he added to the signature a trombone trill, with the explanatory word *minacciando* (threateningly), the whole marked for the gruff sixteen-foot bass trombone. This instrument would sound only a tone above Wagner's eighteen-foot contrabass colossus.

Schubert, the apostle of purity and delicacy in music, obtained some beautiful effects with trombones played softly against the strings. In many passages of his great C-major symphony they are called into requisition, an especially prominent phrase occurring in the coda of the first movement. Weber and Schumann also appreciated the instrument, and Spontini employed it well in the funeral march of the "Vestale." Mendelssohn admired the trombone greatly, considering it too solemn an instrument to be used except upon special occasions.

Berlioz, as usual, capped the climax in respect to number by calling for no less than sixteen trombones in his Requiem. He wished to reproduce the effect of the Day of Judgment, with Gabriel's trumpet sounding, so he called for four groups of brasses (horns, trumpets, trom-

bones, and tubas or ophicleides), and placed one at each corner of his forces to echo the sound to and fro. Even without these extra brass bands, he demanded quite enough instruments to give an adequate reproduction of the crack of doom. The score called for a full band of strings, four flutes, two oboes, four clarinets, eight bassoons, an English horn, twelve horns, four cornets, sixteen tenor trombones, two tubas, four ophicleides, twelve trumpets, sixteen kettle-drums, two bass drums, three pairs of cymbals, and a gong.



VALVE TROMBONE

In most military bands a valve trombone is now used, producing its scale by pistons instead of the slide. This instrument is easier to play than its orchestral relative, and allows the performer to give more rapid execution. But these advantages are more than counterbalanced by inferiority in tone-colour, and this fact alone ought to bar it out

from the orchestra, although it is occasionally found there.

The tuba, like the trombone, is a member of a family of instruments covering a large range in pitch. As in the case of the trombone, the smaller members of the group form no part of the regular orchestra, but under the name of sax horns, they take part in military bands, especially in France. There are in all six divisions of this family: soprano, alto, tenor, baritone, bass, and contrabass. The tenor, and also a small-bored baritone form, are known as alt-horns. The lower instruments constitute the group known as tubas, and under this name are found in modern scores.

The most usual instrument is the bass tuba, or bombardon. It is made of brass, and is played with a mouthpiece similar to that of the trombone. The tuba is equipped with pistons, like the valve horn, but differs from that instrument in having four instead of three. The extra piston lowers the pitch a perfect fourth, and in combination with the others can fill a gap of an octave in the harmonic series. Some combinations of valves will throw the tone slightly off the correct pitch, but as the tuba is played with

loose lips, the player can correct this by blowing at the required strength. This process is similar to the production of the factitious notes on the horn.

The tenor tuba, known as the euphonium, stands in the key of B-flat. Its lowest natural tone is over two octaves below middle C, bringing it in unison with the tenor trombone. Its compass extends upward two and a half octaves from that note, while a few tones still lower in pitch can be produced by the pistons. The bass tuba sounds in the key of E-flat, a fifth lower than the euphonium. Its deeper tones are fuller and richer than those of the smaller instrument, and are more often called into use. The contra-bass tuba is still lower, being usually made in B-flat, an octave below the euphonium. Wagner has included it in his Bayreuth orchestra, and has written for it as deep as the lowest D on the piano.

BASS TUBA

The use of the tubas has been greatly increased by Wagner. In the scores of his Trilogy he calls for no less than five, the two bass tubas being in F instead of E-flat. One of his many effective combinations is that of a tuba as bass to three trombones in four-part harmony. In its capacity of the deepest brass instrument, it is used to form the bass of the brass quartet, often in unison with the low trombones. Some composers have employed its softer notes as bass for the strings, with fair results. The tuba part is usually written as it sounds, though sometimes in France the instrument is treated as transposing.

The tuba has a distinctive colour of its own that is of great value. It lacks the smoothness of the trombone, but its harsh, gruff quality strikes the ear at once. Wagner has made an excellent use of it in the first act of "Die Walküre," to typify the fierce character of Hunding. The weary Siegmund has been driven by a storm and the pursuit of enemies to take refuge in Hunding's forest hut, where he is comforted and refreshed by Sieglinde. Suddenly the footsteps of the returning warrior are heard, and before he has time to enter, the

orchestra sounds forth the motive that is to typify him. It is an abrupt, martial phrase, and when given, as in this case, on the tubas alone, it becomes absolutely brutal in effect. Again, in "Siegfried," where the dragon Fafner is disturbed in the possession of his golden hoard and comes forth to meet his death at the hands of the fearless hero, the tubas, especially the contrabass tuba, are frequently called into requisition. These two examples show that, although more limited in their effects than the other brass instruments, the tubas are still useful members of the orchestra.

The family of keyed bugles, formerly so popular, has no longer any representative in the orchestra. Its most important member, the ophicleide, has been called for until recent years, but is now entirely superseded by the tuba. The name ophicleide comes from two Greek words meaning key and serpent, and gives an appropriate description of the instrument. Alto ophicleides existed, but their quality was disagreeable and they lacked precision in pitch, so they are now discarded. Two kinds of bass ophicleide were employed, one in C and the other in B-flat. The contrabass ophicleide, still

deeper, demanded such lung power that it could be played only by the strongest men.

The tone of the ophicleide is powerful, but decidedly obtrusive. It does not blend well with the orchestra, and this is one reason why the tubas have supplanted it. In the older scores, however, it is often to be met with, and even in the last half-century we find it employed by Schumann, in his cantata "Paradise and the Peri." The best known example of its use occurs in Mendelssohn's "Midsummer Night's Dream" music, where it gives an amusing reproduction of the snores uttered by the drunken weaver Bottom in his sleep.

SERPENT

An instrument now entirely obsolete is the serpent. This was a wooden tube a little over eight feet long, sounding therefore the note two octaves and a semitone below middle C for its fundamental tone. It was provided with keys,

GEORG FRIEDRICH HÄNDEL

and belonged therefore to the same group as the old cornetto. It has been used by Beethoven and Mendelssohn, and appears for the last time in some of Wagner's early scores. It obtained its name from the fact that its tube was bent in actual serpentine curves, for ease in performing. Its tone was powerful, but decidedly rough, and not greatly prized by composers. Handel, on hearing it for the first time, asked his comrades, in his usual broken English, "Vat is dat?" Its tone had so disgusted him, that when he was informed of its name, he replied, "It certainly cannot be de serpent dat seduced Eve."

CHAPTER XI.

INSTRUMENTS OF PERCUSSION

All the instruments previously described have been capable of producing many tones and playing definite melodies. There remains a large number, of more or less importance, that cannot produce such melodies. These instruments are divided into two classes, — those that give an actual tone, and those without any definite pitch.

By far the most important are the kettle-drums, known in foreign countries under the name of Pauken (Germany), timbales (France), or timpani (Italy). These consist of hemispheres of copper, set at a sloping angle on tripods, and covered by a parchment known as the head. This head is held on the drum by a metal ring, and around the edges are certain screws by which the tension can be regulated by the performer. These instruments are often spoken of as the drums, and in orchestral parlance are always meant by this term.

The kettle-drum is not only capable of producing a note of definite pitch, but in the hands of a skilful player can even give variations in the quality of this tone. It is provided with two pairs of drumsticks, one set usually wholly of wood, and the other furnished with tips of soft sponge. Sometimes a third pair is added, tipped with leather. These different sticks each give a special effect to the tone. The performer may also vary its quality by striking the drum at different points, a stroke near the edge producing a sharper and brighter result than one near the middle of the head. The usual place for the blow is about half-way between these two points. Sometimes, when the composer desires an especially dull and hollow effect, he writes for muffled drums, in which case they are covered with pieces of cloth,

KETTLE-DRUM

which subdue the sound and shorten the duration of the tone.

There are always at least two drums of different sizes in an orchestra, both being played by a single performer. The larger drum can be tuned to any note from F, an octave and a half below middle C, up to and including the C an octave below it. The range of the smaller drum begins with the B-flat of the larger instrument, and extends upward a perfect fifth to F. This interval cannot be exceeded without making the head too loose on the one hand or putting it in danger of splitting on the other. The notation is always in the bass clef. Formerly the drums were treated as transposing instruments, and written in C, but that method did not always show clearly the exact pitch, as the words "Drum in F" might refer to either and cause an error of an octave in pitch. It is now customary to write the actual notes for the drums, but without introducing accidentals into the music; a drum in A-flat, for example, would be mentioned as such in the list of instruments, but would have its notes always written as A-natural.

For a long time the drums were tuned simply to the tonic and dominant of the key required,

and were used either to enforce the rhythm or merely for purposes of noise. They were also much used in the humble occupation of reënforcing the bass of the harmony. Gradually their capacities were recognised, and more definite results obtained from them. They can give tones that are long or short, as well as loud or soft. The roll, or trill, is another valuable effect produced from them. When more than two drums are used, as is frequently the case in modern orchestras, they can give solo touches of actual melody.

Beethoven was the first to recognise the artistic possibilities of the drum. "Until Beethoven's time," says an English critic, "the drum had, with rare exceptions, been used as a mere means of producing noise — of increasing the din of the *fortes;* but Beethoven, with that feeling of affection which he had for the humblest member of the orchestra, has raised it to the rank of a solo instrument." It was Beethoven, too, who freed the drum from the fetters imposed upon it by the old custom of tuning in fifths or fourths. In his eighth and ninth symphonies he calls for drums in octaves, giving them a notable passage in unison with the bassoons in the former work.

In one movement of the seventh symphony they are tuned in sixths. In the "Dona Nobis" of his Mass in D, the drums are tuned in B-flat and F, two notes related only distantly to the key of the movement. In all his earlier works, even in the first symphony, they play a prominent part, and in the fifth symphony they are struck together to produce an actual chord. Modern composers have followed Beethoven in having the drums tuned to other pitches besides the simple tonic and dominant. Mendelssohn, for example, has written for the combinations of C-sharp and A, D and E, G and F, and B-flat and D-flat.

For a long time two drums were deemed sufficient for orchestral purposes. Berlioz says that it took seventy years for musicians to discover that it was possible to use three drums; but this statement displays the same quality of exaggeration that is found in his instrumental scores, for Weber employed three, in his overture to "Peter Schmoll," as early as the year 1807. Mendelssohn, Schumann, and Raff have also used this number, and Auber's "Masaniello" overture cannot be properly played with less than three, as the notes G, D, and A are

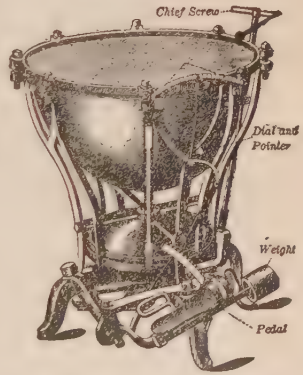
demanded without time being given for the performer to retune his G drum to A. In case a composer desires a change in pitch during a piece, he must give rests enough to enable the performer to carry out his directions. Even in cases where this is done, the player often finds it more convenient to have an extra drum at hand. When the third drum is included in the score, it is usually tuned to the subdominant, although other tunings often enable all three drums to play in harmony and produce chords. Sometimes more than three are required. Wagner has four in his Trilogy, while Spohr, in his "Calvary," calls for six in order to depict the earthquake at the Crucifixion. The climax of noise is reached, as usual, by Berlioz, who, as we have seen, demanded sixteen drums and ten drummers in the score of his Requiem. But Berlioz has shown all his customary skill in employing kettle-drums, and the chord-trill for three drums in his Symphonie Fantastique, suggesting the thunder of the tempest that bereft the shepherd of his companion in the fields, is one of the best passages in existence for these instruments. Meyerbeer, in "Robert le Diable," called for four drums, notated in G, C, D, and E, accord-

ing to the old style, and with their aid produced a tuneful march many measures in length.

Wagner, to whom must be ascribed almost all the richness and variety of our present orchestral colouring, found a new and excellent use for the drum. He employed it in moments of anxiety, or at the advent of some great crisis, to emphasise the effect of suspense or fear by soft strokes in solo passages. These taps serve only to intensify the sudden silence of the rest of the orchestra. The low, irregular strokes of the instrument are not unlike heart-beats made audible. Examples of this device are to be found in "Lohengrin," where Telramund drops dead at the mere sight of the holy sword of the Grail Knight whom he had wished to kill; in the "Flying Dutchman," where Senta, inspired to sympathy by the story of that hapless mariner, is suddenly confronted by his real self; and in the "Götterdämmerung," after Siegfried is stabbed by Hagen. Another wonderful solo phrase for kettle-drum is found in the first act of "Die Walküre," where that instrument echoes with admirable results the strongly marked rhythm of the Hunding motive.

There have been many efforts to simplify the

tuning of the drum, but none of them have met with complete success. They are all aimed to substitute a single motion for the separate movements employed in adjusting the different screws. They include such contrivances as converging iron bars, an endless cord around the edge of the head to be tightened by outside manipulation, and an internal brass hoop to spread the drum near the top. None of these produce absolutely correct results, for the parchment is liable to give unevenly, and can then be properly tightened only by the hand-screws.



MACHINE KETTLE-DRUM

The idea of this mechanical tuning is due to the great kettle-drummer Pfund, who flourished in the middle of the nineteenth century. He has done other services for the instrument, such as publishing a complete method for kettle-drum, and it was he who first won for the post of drummer whatever dignity and importance it has to-day. Before his time the kettle-drum was

usually assigned to any player who was too old or too feeble to continue on some other instrument. But Pfund studied it with enthusiasm from his earliest years, and in after life became drummer under Mendelssohn, in the great Gewandhaus orchestra at Leipsic. Under his skilful strokes the instrument produced a tone of remarkable beauty, almost bell-like in its fulness and resonance.[1]

The kettle-drummer usually has few notes and many rests during an orchestral performance. According to strict rule, he should count these rests and be ready to come in at the proper time. But in actual practice many drummers rely upon the conductor to give them the needed signal, or find their place by means of the few bars pre-

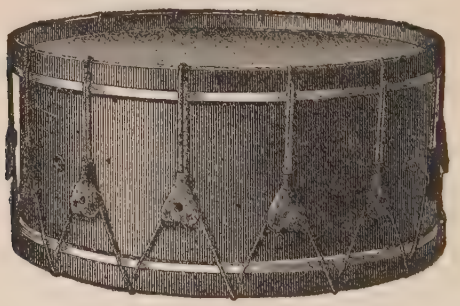
[1] Pfund once produced an unexpected effect from the kettle-drum, which was probably unique. He was extremely miserly in his instincts, and kept close watch over his money. One day, in an unusual fit of generosity, he lent a thaler to a fellow performer. He soon regretted his act, however, and kept bothering his companion for the money so continually that the latter determined to be revenged. Choosing the last minute before a concert, while Pfund had gone out for a moment, the debtor placed a row of pfennige, amounting to the thaler, around the edge of the drum. When Pfund returned to take part in the music, his first kettle-drum stroke caused a shower of small coin to scatter itself over the entire orchestra.

ceding their notes, which are usually written out in their music to give them their cue. Thus if the conductor neglects to give notice, it may often happen that the drum does not come in at all. There is a tradition that Richter's orchestra, in Vienna, possessed a kettle-drummer who could count automatically, even in the longest passages, and who would go out between his notes to obtain refreshment, always returning at the proper time. But this faculty is decidedly unusual, to say the least.

Passages for the kettle-drum alone are of necessity short, even in those works where it is used most. There is no absolute solo repertoire for the instrument, but a concerto for kettle-drum has been composed. This has been played by the English drummer Gordon Cleather, who sat in front of the orchestra while performing it and pounded out his phrases on no less than six different drums.

The bass drum, sometimes called for in the orchestra, is in no way different from the form so familiar in military bands. It differs from the kettle-drum in having no real pitch, giving only a deep and indefinite sound when struck. Its chief use is merely in a rhythmic capacity. Its

notation is usually in the bass clef, on any degree of the scale. Its strokes are almost always designated by C, but composers have used other notes, and may of course choose any one they please. It is customary to give the bass drum a staff of its own, but in many modern works it is written on a single line to save room.

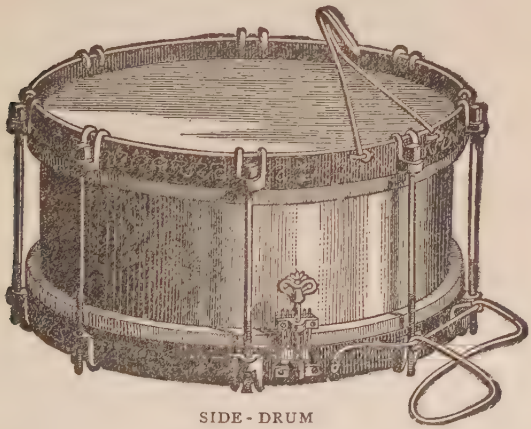


BASS DRUM

The bass drum was formerly played with two sticks, a small and a large one. Besides the ordinary strokes, it can be made to produce a roll, or trill. In France a special stick is often employed for this purpose; it is called the mailloche, and is provided with a knob at each end, being held in the middle by the player. Usually the roll is performed by kettle-drum sticks, which give a better effect. The bass drum was first

introduced into the orchestra by Gluck, in the finale of his "Iphigenie en Aulide." It is usually combined with the cymbals.

The ordinary military drum, known also under the names of side-drum or snare-drum, can be fittingly used in any work that is at all martial



SIDE-DRUM

in character. It can give either single taps or long rolls. Its notation is similar to that of the bass drum, though sometimes the G clef is used for it. A crescendo passage can be worked up with excellent effect by means of the snare-drum, as for example the inspiring scene of the benediction of the poniards in the fourth act of Meyerbeer's "Huguenots." Berlioz, in his

"Damnation de Faust," pictures the soldiers returning to camp at evening by means of the "tattoo." A peculiarly dull and rattling sound can be obtained by relaxing the cords that tighten the drum-head, — a proceeding indicated by the words *schlaff gespannt* in German and *relachée* in French. Wagner has called for this effect in his "Ride of the Valkyries."

Less important is the tambourine, which is nothing but an extremely flattened drum open at one end. It is provided with jingling metal plates which add to the noise whenever it is struck. The performer may vary the effect by rubbing it with his thumb. The tambourine usually appears in Spanish or gipsy music, but Berlioz has allowed it to enter the symphonic score in his Childe Harold Symphony and Roman Carnival Overture.

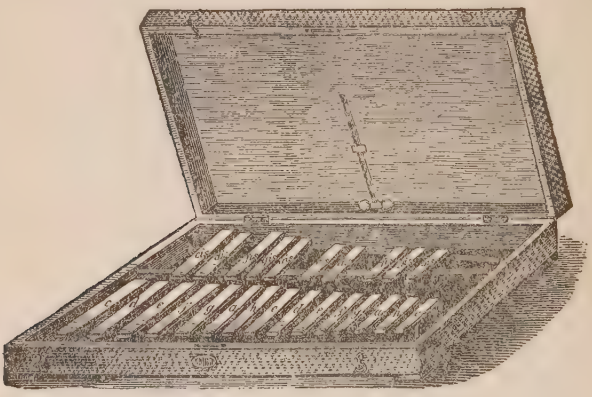
Among instruments producing definite pitch are found the various bells sometimes called for in the orchestra. It is not always easy to tune these to the proper pitch, and to use them effectively. Two bells are required in Bach's cantata "Schlage doch, gewünschte Stunde." Berlioz calls for two in the finale of his Symphonie Fantastique. Tschaikowsky employs

them to picture the rejoicing of the victorious Russians in his "1812" overture, a work composed for an outdoor celebration, and first performed with real bells sounding from a newly dedicated cathedral. On the operatic stage, bells are frequently used. Meyerbeer, in the "Huguenots," employed one to picture the tocsin of St. Germain giving the signal for the St. Bartholomew massacre. Verdi introduced a funeral bell into the Miserere of his "Trovatore." Wagner wrote an attractive four-noted bell figure in his "Parsifal," the tones being produced from heavy steel bars. Long steel tubes are sometimes used for orchestral bells in America, with excellent effect.

The glockenspiel, or carillon in French, is a set of flat steel plates which give a sweet, bell-like tone when struck with a mallet. Their sound is not unlike that produced by striking a cut-glass goblet. Although a member of the percussion group, this instrument differs from the others in being able to give definite melodies. Mozart has used its tinkling tones in his "Magic Flute," and Wagner has employed them in the delicate tracery of the slumber scene in "Die Walküre," also at the entrance of the toy-

makers' guild in "Die Meistersinger." The usual compass of the glockenspiel is a little over two octaves, beginning with middle C on the staff, but sounding an octave higher than written.

Resembling the glockenspiel in shape, but

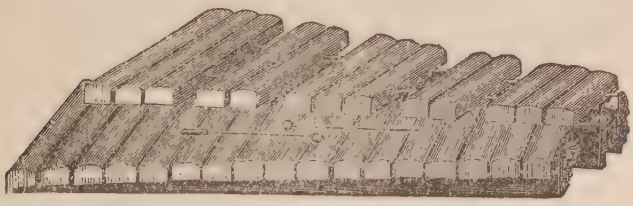


GLOCKENSPIEL

with bars of wood instead of steel plates, is the xylophone. The tone of the latter instrument can hardly be called musical, and except for the passage given to it by St. Saëns in his "Danse Macabre," it has no legitimate place in orchestral music. Made of similar material are the castagnettes, which are small bits of ebony or boxwood clicked together by the hand. They, like

the tambourines, are much used in Spanish or gipsy music, and add their rhythmical effect to tropical dances. They find excellent employment in Bizet's beautiful opera of "Carmen."

Cymbals are of Oriental origin, coming from Arabian or Turkish sources. They are a pair of round metallic plates, made of a mixture of copper and tin, and clashed together by the performer. Usually they are played by the bass



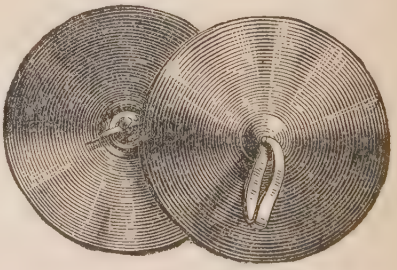
ZYLOPHONE

drummer, with one plate fastened on the drum, but a better tone results if they can be held entirely in the hands and struck slant-wise against one another. Their notes are often written with those of the bass drum, a double stem indicating the use of both instruments. The loud tones of the cymbals, even when quickly damped for the staccato, give an excellent suggestion of combat. They are also useful in scenes of wild revelry. Wagner uses

them for this purpose in the Venus scenes of "Tannhäuser," where he has produced also a mysterious tremolo by having them rattled together softly. He has also called for a roll, to be played on one cymbal with a pair of drumsticks. Another of his effects is a single stroke on a hanging cymbal, giving the impression of a softened gong. Berlioz has also used this method to produce the final note of his Symphonie Fantastique. The cymbals give no definite pitch, as irregular vibrations are so prominent that they drown the fundamental tone.

CASTAGNETTES

Even the gong, or tam-tam, may play its part in orchestral scores. This well-known instrument, or perhaps implement, does not produce a single note, but gives



CYMBALS

a mixture of "by-tones" like those produced by the cymbals. It may be legitimately employed to picture any catastrophe. The use of the gong in soft effects is a skilful touch also. Such *piano* strokes are to be found in Meyerbeer's "Robert le Diable," just before the rising of the

TRIANGLE

nuns, and in Rossini's "Semiramide," when the tomb of Ninus opens to allow the ghost of that monarch to issue forth.

The triangle is a small steel bar bent into a three-sided figure, held suspended on a string and struck by a tiny steel rod. It has no definite tone, and is used merely for rhythmic effects.

It is found in Haydn's Military Symphony, Beethoven's ninth, and Schumann's first, but its proper place is in the lighter sorts of orchestral music. Weber has used it in imparting gipsy colour to his opera of "Preciosa." Probably its most noted employment is in Liszt's piano concerto in E-flat, where it is actually used in a solo passage, to announce the rhythm of the principal theme.

CHAPTER XII.

THE ORCHESTRA

All of the instruments that have been considered in the previous chapters, except some of the percussion, have been melodic in character. They were capable for the most part of producing but one tone at a time, and even in the stringed instruments double-stopping was merely a point of advanced technique, and not the usual method of expression. But there exist instruments that can produce many notes simultaneously, forming chords and progressing in harmony as well as melody. Such are for instance the piano and organ; but greater than either of these, and capable of giving infinitely more varied effects, is the orchestra itself, taken as a whole.

Just as the pianist or organist plays upon his instrument, so the conductor plays upon the orchestra. His music is written for him, in the score; he cannot improvise, but he can perform a symphony or an overture with as much indi-

viduality in the interpretation as if he were seated at the piano. The instruments are his keyboard, and the players execute his will just as the pianist's fingers do in the other case. He may play loud or soft, fast or slow; he may emphasise any particular theme that he chooses; and he is the one to express the composer's meaning as best he may, in either case.

Conducting in the mere sense of keeping time for vocal or instrumental forces is as old as the days of Greece. In the theatre of ancient times, the duty of leading devolved upon the choregus, who led his performers by rhythmical taps with an iron shoe. In the middle ages, we find Charlemagne, in similar fashion, beating time by tapping with a wooden staff. At the beginning of the modern era, the Italian violinists kept up the custom by rapping on their instruments with the bow whenever necessary, and taking part in the music themselves during the easy passages. The leaders of our present small theatre orchestras employ exactly the same procedure to-day.

The use of the baton did not become common until well along in the last century. The method of tapping the floor with a stick was formerly very general, and is held responsible for the

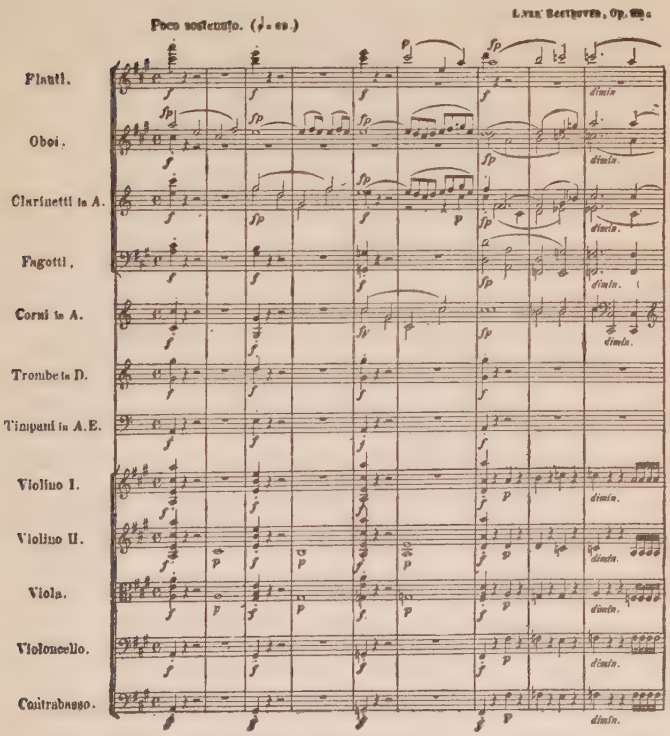
death of Lully in the latter part of the fifteenth century. That composer had written a Te Deum in honour of the French king's recovery from a serious illness. At its first performance Lully himself conducted, and when he found the orchestra growing a little unsteady, he made such frantic flourishes with the cane which served him as baton that he struck his foot violently. Inflammation resulted, but he gave it no attention; finally gangrene set in, and the amputation of his leg, thus rendered necessary, was the prime cause of his death.

In the time of Bach and Handel, the composer usually conducted his works by playing a harpsichord or organ accompaniment for them. There was no definite score for any of the works then written. The orchestral parts were of course necessary for the performers, but only the merest outline of the work was set before the leader, who played his own part from a figured bass. Haydn and Mozart were the first of the great composers to write out their orchestral works in full, and with Haydn conducting began to approach its present form.

Beethoven, in spite of his intimate knowledge of the instruments, was not at all a great con-

ductor in the present sense of the term. Even in the prime of his life, he was too strange and eccentric in his moods to make a good leader. In his later years, when deafness had come upon him, it seems strange that he could conduct at all; yet he continued to lead the performances of his symphonies, in spite of this malady. It is said that more than once he led his forces to disaster, until finally the musicians agreed to follow the first violinist and pay no attention to the irregular motions of Beethoven's conducting-stick.

Spohr and Weber were both excellent conductors. The latter, especially, brought this part of the musical art to a high level, though not even he would rank as a great leader to-day. The art of conducting first reached its present standard with the advent of Mendelssohn. Under his efficient guidance the Leipsic Gewandhaus orchestra won the high rank that it occupies even at the present day. Like Spohr, he won much fame by his leadership of the London orchestra. He is described as somewhat of a martinet, but he earned the good will and respect of the players by the thorough knowledge that he displayed. His conducting was like his music,



SCORING OF THE CLASSICAL PERIOD

sunny and cheerful, but perhaps not reaching the real depths of musical expression. He once made the remark to Wagner that too slow a tempo was disgusting, and that he would rather err on the side of rapidity. When Wagner came to conduct the London orchestra, he found Mendelssohn's style so firmly fixed there that the single rehearsal before each concert was not always sufficient for the newcomer to alter the traditions.

What Mendelssohn did in Germany, Berlioz carried out in France. He has left on record his idea of a leader's duties. "The conductor should see and hear," he writes. "He should be active and vigorous, should know the composition, the nature and compass of the instruments, should be able to read the score, and possess that indefinable attraction that forms an invisible link between him and those he directs. . . . They should feel that he feels, comprehends, and is moved; then his inward fire warms them, his magnetic glow electrifies them, his force of impulse excites them; he throws around them the vital irradiations of musical art. If he be inert and frozen, on the contrary, he paralyses all about him."

It seems strange that Berlioz, in spite of his being such a good conductor, should make such inordinate calls for wholesale effects in his compositions. Experience must have shown him that a small band can be guided with more certainty than a large one, yet in his suggestion for a permanent festival organisation in Paris he included four hundred and sixty-seven instrumentalists and three hundred and sixty singers. In one actual performance he had no less than twelve hundred people under his direction. He employed four chorus-masters, one at each corner of the vocal forces, and two sub-conductors, one for the wind-instruments and one for the instruments of percussion; all of these subordinates looking toward him and taking their time from him.

The only good result obtained by such large numbers is a full volume of tone. But volume of tone is not the only point, nor even the most important, upon which a conductor should insist. Accuracy in shading is a prime necessity. So is precision in playing, unity in attacking the notes, especially at the entrance of any instrument, and all the other details that are included in the term *ensemble*. These results cannot be properly

attained in a monster orchestra, as any undue increase in the forces at once interferes with delicacy in playing. Modern musicians hold that the best results are obtained from an orchestra of a hundred in a hall seating about a thousand. Wagner's Bayreuth theatre, which has room for about twelve hundred, and employs a hundred and sixteen players concealed beneath the stage, comes near to fulfilling these ideal conditions.

Wagner himself was a most gifted conductor. His remarkable musical sense afforded him a complete insight into every composition that he performed, and it was his thorough acquaintance with the works of Auber, Bellini, and others that enabled him to see their triviality and seek to express something deeper in his own music. He was not the first to conduct without a score, but he often adopted this procedure with Beethoven's works. Conducting from memory is not such a tremendous feat as it might seem to the uninitiated; for the leader may rely upon his men to a great extent, and need remember only a general outline of the piece, with the places where he must give his signals for the different instruments to come in. But in Wagner's case

the memorisation was complete. When he first came to his orchestra without a score, prepared to play Beethoven's ninth symphony, some of the musicians were disposed to ridicule his action as bravado; but he challenged any one of them to write a few measures of any particular part, and offered to prove his absolute knowledge of the work by continuing this part when the player had ceased. Such thorough musical understanding is given only to a few gifted geniuses; but it makes an invaluable conductor.

Von Bülow, one of the greatest of drill-masters, went even farther, and demanded that the performers of his Meiningen orchestra also should memorise their parts. He was endowed with an absolute passion for accuracy, and gave the most careful attention to phrasing, shading, and technique. The members of his orchestra became so efficient that on one occasion, when he was unavoidably late, they started in to play the first number of the program, the "Tannhäuser" overture, without any leader, and were finishing it successfully by the time he appeared.

In spite of the cases of Mendelssohn, Wagner, and Berlioz, it is generally true that composers make bad conductors. Unless they are endowed

with unusual breadth of character, they are apt to become one-sided and favour their own especial style of compositions. Spohr was a case in point, despite the high rank that he justly earned; and in his autobiography he has criticised Beethoven's symphonies as dull and uninspired. Another trouble with the composer lies in the fact that he is apt to forget his duties to some extent in listening dreamily to the music. This was especially true of Schumann. Liszt was also an instance of the fact that creative excellence does not imply skill in interpretation. Not even to-day given full credit for the wealth and beauty of musical thoughts in his compositions, he was never truly successful as an orchestral leader. Richter, on the other hand, became famous in conducting. It is related of him that on the day when he finally decided to devote himself to this art, he burned all his compositions and made a cup of coffee over the fire,—a costly beverage, indeed.

Among modern French conductors, Lamoureux was worthy of the highest rank. He won his greatest triumphs in Paris, where he conducted the opera for a time, and established the "Concerts Lamoureux." Justly celebrated also

SYMPHONIE N° II.

R. Schumann. Op. 61

Sostenuto assai. M. M. ♩ = 76.

Pauken in C, G.

Trompeten in C.

Hörner in C.

Flöten.

Hoboen.

Clarinetten in B.

Fagotte.

Posaunen. Alt. Tenor. Bass.

Pos. Alt.

Violine 1.

Violine 2.

Bratsche.

Violoncell.

Contrabass.

Sostenuto assai.

SCORING WITH BRASSES AND PERCUSSION AT TOP

was Colonne, who brought out many of the grand works of Berlioz, and a number of famous modern German compositions. In Germany, there has arisen a set of great Wagnerian conductors, among whom were Levi, now dead, Mottl, who has made Karlsruhe renowned for its musical excellence, and last, but by no means least, Anton Seidl, whose labours in the Wagnerian cause are applauded by an admiring public even after his death.

Richard Strauss is now ranked among the few great living conductors. His prodigious skill in composition has not prevented him from winning remarkable triumphs at the Berlin Royal Opera. Weingartner, leader of the Kaim concerts in Munich, is also in the foremost rank of living conductors. Nikisch, known in America through his connection with the Boston Symphony Orchestra, is one of the most gifted of leaders, and conducts the most intricate orchestral scores without notes. He is at present conductor of the Leipsic Gewandhaus orchestra and the Philharmonic concerts in Berlin. Another famous name is that of Mahler, now director of the Imperial Opera in Vienna. His compositions are the only ones of the present, except those of Hau-

THEODORE THOMAS.

segger, which are deemed worthy of comparison with the works of Richard Strauss.

Among American conductors, Theodore Thomas deserves the highest praise, not only for his gifts as a leader, but for his unswerving fidelity to true art and his successful work in educating public taste. He conducts with the utmost animation and vigour. Wilhelm Gericke, leader of the Boston Symphony Orchestra, excels in effects of clearness and delicacy, while Emil Paur, who recently left the New York Philharmonic Orchestra to return to Germany, inclines to broader and more spirited effects.

The great orchestras of the world are none too numerous. That in Boston must surely be accorded high rank among them, especially in regard to its string band; while the New York and Chicago organisations are little behind it.[1] Among the many European orchestras, the foremost are the Leipsic Gewandhaus, the Berlin Philharmonic, and the Vienna Philharmonic. The Conservatoire concerts in Paris are also justly celebrated. In the days of Von Bülow, the Meiningen orchestra was one of the few truly great bands.

[1] Other permanent American orchestras exist in Philadelphia, Washington, Pittsburg, and Cincinnati.

The orchestra may be regarded as an instrument from the composer's point of view, as well as from that of the conductor. He writes for it with just as definite musical intentions as a piano composer writes a sonata or a nocturne. In the orchestra, however, the labour of writing is vastly increased, for each instrument demands a separate staff. If the piano composer had to write on a different staff for each finger, his task would become much harder than it now is. But the orchestral writer must express his thoughts on many more than ten staffs, as the number of instruments now employed is much larger than it was formerly. Even in Beethoven's symphonies, for example, at least twelve staffs are needed in the score, — flutes, oboes, clarinets, horns, trumpets, bassoons, kettle-drum, first and second violins, violas, 'cellos, and contrabasses. At present we may have also piccolo, English horn, bass clarinet, contrabassoon, trombones, tuba, contrabass tuba, and many instruments of percussion. When it is also considered that some instruments, such as the horns, are often grouped for two staffs instead of one, it will readily be seen that the composer of the present has no easy task in putting his thoughts on paper.

ORCHESTRAL INSTRUMENTS
AND THEIR USE

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A MODERN SCORE

Beethoven wrote and rewrote his music, perfecting and polishing it until it reached its final flawless state. As instances of more rapid composition, Handel composed his "Messiah" in twenty-three days, and his opera "Rinaldo" in just two weeks; Mozart wrote the overture to "Don Giovanni" in one night; Mendelssohn had only two days in which to write his "Ruy Blas" overture, in order to have it ready for the concert at which it was to be performed; and Rossini completed the whole of his "Barber of Seville" in fifteen days. This speed is usually due to the fact that the great composers, those who are naturally gifted, like Mozart, Mendelssohn, or Wagner, have the music entirely worked out in their heads before they put pen to paper. The mere writing, in such cases, is nothing but a simple copying down of ideas already formed.

The abstract musical thought exists in the composer's brain, irrespective of any instrument. It is like the composition, the drawing of a picture. Before either musician or artist can give his work to the world, he must choose and blend his colours with due regard to the standards of his art and his own ideas of beauty. What these colours are for the composer, it has

been the object of this book to show. Briefly summed up, they are as follows:

Violin. — All emotions.

Viola. — Brooding melancholy and gloom.

Violoncello. — All emotions. Masculine in effect where violin is feminine.

Contrabass. — Ponderous, portentous, or also comical.

Harp. — Ecstatic, celestial effects.

Flute. — Gently melancholy (lower register), or brilliant (upper register).

Piccolo. — Wild, frenzied gaiety. Used in infernal effects.

Oboe. — Grief and pathos; artless innocence; rustic gaiety.

English horn. — Broadly melancholy; imitates shepherd's pipe.

Bassoon. — Earnest and sombre (lower register), or grotesquely comical.

Contrabassoon. — Deep, impressive, organ-like.

Clarinet. — Eloquent and tender, or spectral (lower register).

Bass Clarinet. — Sombre.

Horn. — Romantic, as in forest scenes or hunting calls, or evil and repulsive when its tones are muted.

Trumpet. — Martial and bold.

Trombone. — Solemn, or menacing.

Tubas. — Brutal and powerful.

Kettle-drums. — Explosive effects, or those of anxiety and suspense.

Other Drums. — Military effects.

Cymbals. — Clash of battle, or festivity.

Glockenspiel. — Tinkling sweetness.

Tambourine and Triangle. — Spanish or gipsy effects.

With these colours is produced all the beauty of orchestral effect that has given modern music its richness and glory. They do not and cannot atone for any lack of definite musical ideas on the composer's part. But if the themes themselves be worthy, these varied instrumental hues enable him to weave his thoughts into a rich web of sound that seems actually to glow upon the ear, with all the passionate warmth that the colours of a Titian appeal to the eye.

THE END

APPENDIX

THE ACOUSTICS OF TUBES

When any stretched string is vibrating, — that of a violin, for example, — the material seems to sway from side to side. But, as a matter of fact, the impulse that makes it move does not act in that direction, but travels along the string from one end to another. This may be seen from the example given in Chapter III., where a simple jerk of a long hanging rope was mentioned as travelling *up* the rope, while the actual strands were moved sidewise. Such a jerk would travel up to the top of the rope, where the strands, after swinging to one side, would be pulled back by the fixed point of support, and the direction of the swing reversed. It would then travel down the rope, to its lowest point, where a second jerk like the first would cause a repetition of the whole.

In a somewhat similar way, each vibration of air will travel to and fro along a tube. The

air particles are compressed at the mouthpiece, by a vibration of the reed or the player's lips. This compression then travels through the tube, until it reaches the end. It then dissipates itself into the outer air, and by this very scattering causes a reaction to travel back from the end of the tube to the mouthpiece. At the opening in the mouthpiece, this expansion is again transformed into a compression, and by that time a second vibration of the material causing the sound is ready to reënforce this compression with another. The successive compressions, therefore, proceed into the outer air at a distance from one another equal to twice the length of the tube. So if a tube is two feet long, the compressions will be four feet apart, which is the same as saying that the wave-length is four feet. As sound travels about 1,120 feet a second, there will in consequence be 280 such waves in the distance travelled a second, or 280 vibration-blows per second upon the ear of a stationary auditor. This tone is about the same in pitch as middle C on the piano, and would be the lowest note of a flute or oboe two feet long.

The case of the air-particles in such a tube is not unlike that of a train of cars coupled loosely.

Suppose that an engine, also attached loosely, gives alternate pulls and pushes to the train. The first push travels from car to car, until the last one is reached. This one, tending to fly off, is held back by its neighbour, upon which it therefore exerts a pull. Meanwhile the engine has given a pull at its end. These two pulls travel along the train in reverse directions. When the pull given by the last car reaches the engine, it finds the engine ready to aid it in its pulling tendency by giving the second push. Meanwhile the pull from the engine has reached the last car, and the last car is drawn in by it, and caused to exert a push on its next neighbour. Thus there is an alternation of pulls and pushes crossing each other in the centre of the train, and being transformed from one thing into the other at each end. Each impulse, therefore, travels twice the length of the train (down and back) before being reënforced by the engine.

Suppose now that the engine is too big and unwieldy to change quickly from pushing to pulling. Its first push travels up the train, and comes back as a pull. When this pull reaches the engine, the engine itself is only ready to exert

its first pull. Engine and car, both trying to pull in opposite directions, will be drawn toward one another, and the car, in moving toward the engine, exerts a pull on the second car, which travels down the train again. This pull is transformed into a push by the last car, and sent back toward the engine. It tends to push the engine, but the engine itself is now ready to push, and being heavy it overpowers the push of the car. Thus in one case the impulse of the engine travelled down and back once before being reënforced, and found the engine always ready to reënforce it. In the other case the impulse had to travel down and back twice before resuming its first shape for the second time, and always found the engine in opposition to it.

This second case is what happens with the clarinet. As the reed is large, it has sufficient force to overcome or "govern" the air-column in the tube, while the smaller oboe or bassoon reed cannot do this. The result is that in the case of the clarinet the vibrations must travel down the tube and back twice, or four times its length, before resuming their original condition. There is first a compression travelling from the reed to the end of the tube. Returning as a rarefaction, it is not

transformed this time, as it would have been in a flute or oboe, but is sent on its second trip down the tube as a rarefaction, to be changed and sent back up the tube for the second time, now at last in the form of a condensation. The reed, now ready for its second vibration, augments this condensation and sends it down the tube. This doubling of the wave-length allows only half as many such waves or vibrations to fit into the 1,120 feet that sound travels per second, so a clarinet will have only half as many vibrations as a flute or oboe of the same size, and in consequence will sound an octave lower in pitch.

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